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STUDIES
OF
N A T U R E.

VOL. III.

STUDIES
OF
N A T U R E.

BY
JAMES-HENRY-BERNARDIN
DE SAINT-PIERRE.

.....MISERIS SUCCURERE DISCO.

TRANSLATED BY
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IN FIVE VOLUMES.

VOL. III.

London:
PRINTED FOR C. DILLY, IN THE POULTRY.

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EXPLANATION of the PLATES.

FLOWERS. PLATE III.

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AS the explanation of this Plate is inserted in the text, all I shall say of it here is this, that all the forms of flowers, which have a direct relation to the Sun, may be reduced to those five primary patterns of flowers, to reverberated perpendicular, conic, spheric, elliptic, and plane or parabolic; and flowers which have negative relations to the Sun, to the five other patterns of flowers in parasol, which are here represented in contrast with the first. At the same time, though these last be of forms much more diversified than reverberated flowers, all their negative species may be referred to those five positive forms.

I am of opinion, that if there were added to those five positive, or primordial forms, a certain number of accents, to express the modifications of them, we should have the true characters of the florification, and an alphabet of that agreeable part of vegetation. I likewise presume, that by means of this alphabet, it might be possible to characterize, on geographical Charts, the different sites of the vegetable kingdom.

kingdom. It would be sufficient to apply the signs of them to the forests which are there represented ; for on seeing in the Chart, for the sake of supposition, that of the reverberated perpendicular, expressed by an ear of corn, or a prominent cone, we should instantly distinguish in it the forests of the North, or those of cold and lofty mountains. Particular accents, superadded to this character of prominent cone, would distinguish from each other the pine, the epicæa, the laryx, and the cedar ; and rays issuing from these modified characters, would indicate the extent of the kingdoms of those different species of trees. The thing is not so difficult as may be imagined. Geography easily represents forests upon maps ; all that would be farther requisite, therefore, is to affix to them certain signs, in order to ascertain their species, and these signs might likewise characterize, as we have seen, the latitude, or the elevation of the soil. Besides, we should leave out of such botanical Charts a multitude of political divisions, the names of which, in large characters, uselessly fill up a great deal of room. We should represent in them the domains of Nature only, and not those of men. Thus, by means of these botanical signs, we might distinguish, at a single glance, on a map, the productions natural to each soil, the forests, with their different species of trees, nay, the meadows too, with the varieties of their herbage. There might be farther conveyed the humidity or the dryness of the territory, by adding to the signs of the flowers, the characters of the leaves and seeds of vegetables. To these might afterwards be affixed, on the cities and villages represented, ciphers expressing the number of Families who inhabit them, as I have seen in Turkish maps ; thus we should have Charts really geographic, presenting at the first glance, an image of the richness
and

and of the temperature of the territory, and of the number of it's inhabitants. After all, this is not a plan which I presume to prescribe, but ideas which I have ventured to suggest, to be pursued, improved, and brought to perfection.

VOLATILE GRAINS. PLATE IV.

VOLUME III. PAGE 170.

HERE is presented, on the one hand, the *spartha*, or rush of the Spanish mountains, hollowed into a gutter, for the purpose of receiving the rain water ; and, on the other, the cylindric or full rush of the marshes. The grain of this last resembles, in it's state of expansion, the eggs of a lobster. I have not been able to procure any of the grains of the *spartha* ; but I have no doubt that, in opposition to those of the rush of the marshes, it must have a volatile character. I do not so much as know whether the *spartha* fructifies in our climate. Messrs. *Thouin*, the principal gardeners of the Royal Garden at Paris, could easily have gratified my curiosity in this respect. To these gentlemen I stand indebted for furnishing me with most of the grains and leaves which I have got engraved for this Work, among others the cone of the cedar of Lebanon ; but accustomed, in my solitary studies, to investigate, in Nature alone, the solution of the difficulties which she throws in my way, I did not make application to them, though their hearts are replete with liberality and complaisance, toward the ignorant as well as to the learned.

Whatever the case may be as to this, it is to the fruit that Nature attaches the character of volatility ; and it is by the leaf that she indicates the nature of the site in which the vegetable is destined to grow. Accordingly we perceive, in this plate, the cone of the cedar to be composed of thin flakes

flakes like the artichoke. Every flake carries it's kernel : such is the one here represented, detached from the cone ; and each of them, as the fruit comes to maturity, flies off, by the help of the winds, toward the summit of the lofty mountains, to which it is destined. Remark, likewise, that the leaves of the cedar are filiform, in order to resist the winds, which are violent on lofty mountains, and they are aggregated into clusters resembling pencils, for the purpose of collecting, in the air, the vapours which float about in it. Each leaf of this tree has more than one aqueduct traced in it lengthwise ; but as it is extremely minute, it was impossible to express it in the engraving. Farther, that filiform and capillaceous shape, so well adapted to resisting the winds, as well as that which is of the sword-blade form, is common to vegetables of the mountains, such as pines, larches, cedars, palm-trees ; it is, likewise, frequently found on the edge of waters equally exposed to violent winds, as in rushes, reeds, the leaves of the willow ; but the foliage of these last differs essentially from that of the first, in that there is no aqueduct in it, whereas the leaves of mountain vegetables have one ; neither is their aggregation similar.

The dandelion grows, like the cedar, in dry and elevated situations. It's grains are suspended to a complete sphere of shuttle-cocks, which forms outwardly a very regular polyedron, having a multitude of hexagonal, or pentagonal faces. These faces are not expressed in the print, because it has been copied after that of a highly valued botanical Work, but which, like books in every department of literature, collects only the characters which make for a favourite system. The leaf of the dandelion particularly determines it's natural site ; it is broad and fleshy, because expanding

panding itself close to the ground, on which it forms stars of verdure, it has nothing to fear from the winds: it is deeply indented, like the teeth of a saw, for the purpose of opening a passage to the grasses; and it's indentings are bent inward to catch the rain-water, and convey it to the roots. Thus Nature adapts the means to each subject, and redoubles her attention in proportion to it's weakness. The sphere of the dandelion is more artfully formed than the cone of the cedar, and, beyond all contradiction, much more volatile. It requires a tempest to carry the seeds of the cedar to any considerable distance; but the breath of the zephyr is sufficient to re-sow those of the dandelion. A Lebanon is likewise necessary for planting the first, but the second needs only a mole-hill. This small vegetable is likewise more useful in the World than the cedar; it serves for food to a great many quadrupeds, and to a variety of small birds, which fatten on it's grains. It is very salutary to the human species, especially in the Spring season. We accordingly find great numbers of poor people, at that time, picking up it's young shoots in the fields. It is, moreover, the only plant which Nature presents gratuitously to Man in our Climates. It universally thrives in dry places, and even in the seams of the pavement. It frequently carpets the court-yards of Hotels, the masters of which are not over-burthened with vassals, and seems to invite the miserable to walk in. It's gold-coloured flowers very agreeably enamel the foot of walls, and it's feathered sphere, raised upon a long shaft, in the bosom of a star of verdure, is by no means destitute of beauty.

It is the leaf, then, which particularly determines the natural site of a vegetable; for, as we have seen, there are aquatic plants which have their grains volatile, because they

they grow on the brink of lakes or marshes, which have no currents, such as the willow and the reed ; but their leaves, in that case have no aqueduct. Nay, there are some which have a pendent direction, and which, from that attitude, refuse to admit the water from Heaven. The maple of Virginia, which delights in the brinks of lakes, marshes, and creeks, has grains attached to membranous wings, resembling those of a fly, as the seeds of the mountain maple represented in the plate. But there is this remarkable difference between them, that the broad leaf of the first is pendent, and attached to a long tail ; that this tail, so far from being furnished with an aqueduct has a ridge ; and that the leaf of the mountain maple, which is of a moderate size, angular and barky, for resisting the winds, rises almost vertically, and bears an aqueduct on it's tail, to receive the waters of Heaven.

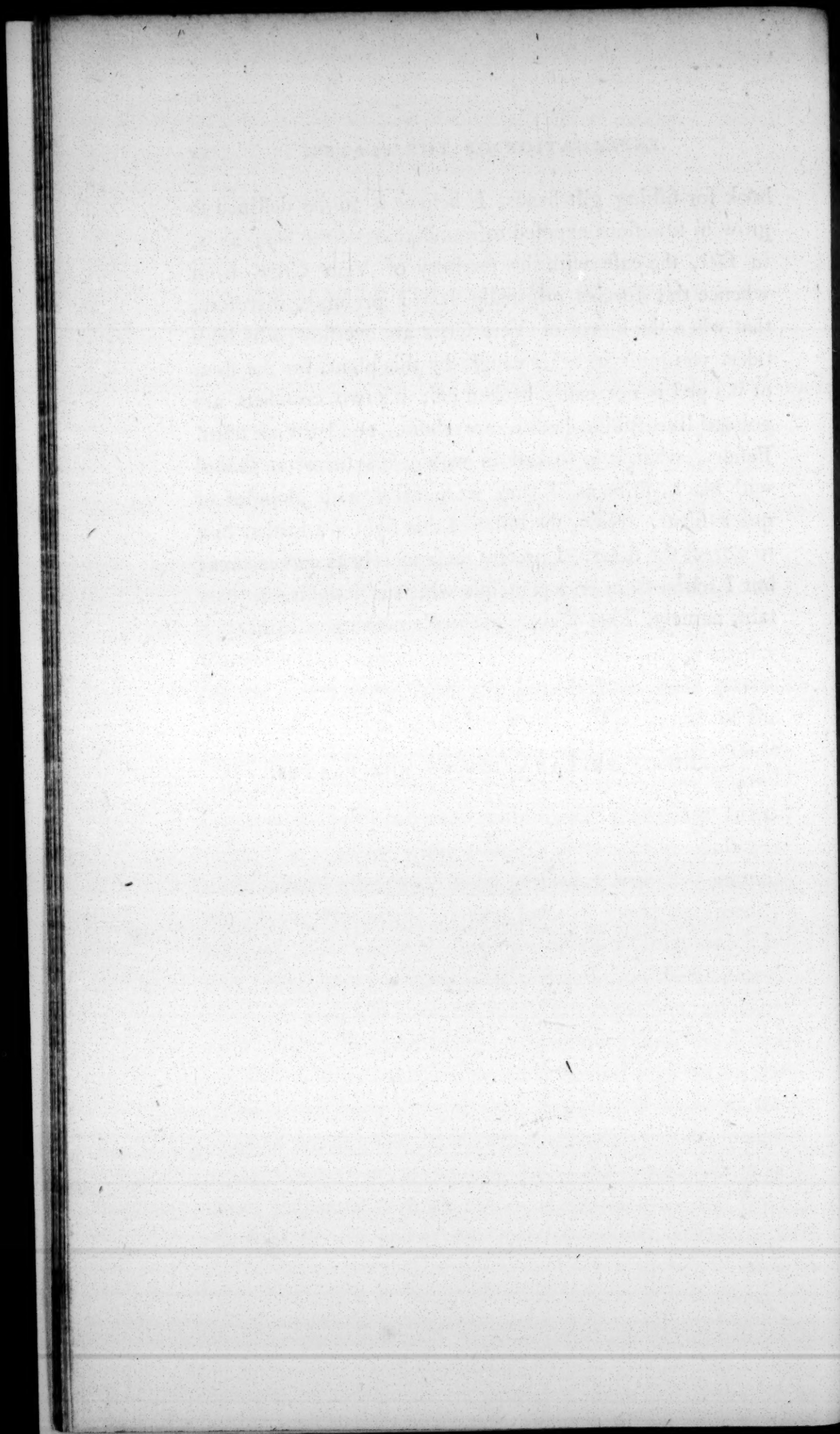
AQUATIC GRAINS. PLATE V.

VOLUME III. PAGE 191.

AQUATIC grains have characters entirely opposite to those which are produced on the mountains; if we except, as has been said, those which thrive on the brink of stagnant waters; but even these possess, at once, volatile and nautical characters, for they are amphibious. They swim along the surface of the water, and they fly through the air; such is that of the willow, and several others. It is the leaf which determines the site, as we have observed, for aquatic plants never have any aqueduct on their leaves. Nay, most of them repel the water. The leaves of the nymphæa and of the reed are never wet. It is likewise so with those of the nasturtium, which are never humid, however copiously the rain may fall, though that plant is excessively fond of the water; for the culture of it consumes an incredible quantity. I am persuaded that if a morass were sown with plants of this sort, it would be speedily dried up. The leaf of the martinia of Vera Cruz, which is here represented among aquatic plants, is, on the contrary, always humid. It has even, in its first expansion, a fluting on its tail. From this double mountain-character, I am disposed to suspect that the martinia naturally grows on the parched and sandy shores of the Sea; for Nature, in the view of varying her harmonies, extends very dry places along the brink of the waters, just as she deposits sheets of water and morasses in the bosom of mountains. But from the form of the pod of the martinia, which resembles a
hook

hook for fishing gilt-heads, I believe it to be destined to grow in situations exposed to inundations of the Sea, as is, in fact, the case with the territory of Vera Cruz, from whence this species originally is. I presume, therefore, that when the shores of Vera Cruz are overflowed by high tides, you must see fishes caught by this plant, for the stem of it's pod is not easily broken off; it's two crotchets are pointed like fishing-hooks, are elastic, and hard as horn. Besides, when it is soaked in water, it's furrows, shaded with black, shine as if they were filled with globules of quick-silver. Now, the lustre of this light is a farther bait to attract the fishes. I present these merely as conjectures; but I found them on a principle which is indubitably certain, namely, That Nature has made nothing in vain.

END OF EXPLANATION OF THE PLATES.



STUDIES
OF
N A T U R E.

SEQUEL OF STUDY X.

OF THE HUMAN FIGURE.

ALL the harmonic expressions are combined in the Human Figure. In treating this article, I shall confine myself to the examination of some of those which compose the head of Man. Observe, it's form is an approximation to the spherical, which, as we have seen, is *the* form, by way of excellence. I do not believe that this configuration is common to it with that of any animal whatever. On it's anterior part is traced the oval of the face, terminated by the triangle of the nose, and encompassed by the radiations of the hair. The head is, besides, supported by a neck of considerably less diameter than itself, which detaches it from the body by a concave part.

This slight sketch presents to us, at first glance, the five harmonic terms of the elementary generation of forms. The hair exhibits lines; the nose the triangle; the head the sphere; the face the oval; and the void under the chin the parabola. The neck which, like a column, sustains the head, exhibits, likewise, the very agreeable harmonic form of the cylinder, composed of the circular and quadrilateral.

These forms, however, are not traced in a stiff and geometrical manner, but imperceptibly run into each other, and mutually blend, as the parts of the same whole ought to do. Thus the hair does not fall in straight lines, but, in flowing ringlets, harmonizes with the oval of the face. The triangle of the nose is neither acute, nor does it present a right angle; but, by the undulatory swelling of the nostrils, presents a harmony with the heart-form of the mouth, and, sloping toward the forehead, melts away into the cavities of the eyes. The spheroid of the head, in like manner, amalgamates with the oval of the face. The same thing holds with respect to the other parts, as Nature employs, in their general combination, the roundings of the forehead, of the cheeks, of the chin, of the neck, that is, portions of the most beautiful of harmonic expressions, which is the sphere.

There

There are, farther, several remarkable proportions which form, with each other, very pleasing harmonies and contrasts: such is that of the forehead, which presents a quadrilateral form, in opposition to the triangle, compounded of the eyes and the mouth; and that of the ears, formed of very ingenious acoustic curves, such as are not to be met with in the auditory organ of animals, because, in the case of mere animals, it is not intended to collect, like that of Man, all the modulations of speech.

But I must be permitted to expatiate, somewhat more at large, on the charming forms, assigned by Nature to the eyes and the mouth, which she has placed in the full blaze of evidence, because they are the two active organs of the soul. The mouth consists of two lips, of which the upper is moulded into the shape of a heart, that form so lovely, as to have become proverbial for its beauty; and the under is rounded into a demicylindric segment. In the opening between the lips, we have a glimpse of the quadrilateral figure of the teeth, whose perpendicular and parallel lines contrast most agreeably with the round forms adjoining, and so much the more, as we have seen, that the first generative term being brought into union with the supremely excellent harmonic term, that

is, the straight line with the spherical form, the most harmonic of all contrasts results from it.

The same relations are to be found in the eyes, the forms of which combine still more the harmonic elementary expressions; as it was fit the chief of all the organs should do. They are two globes, fringed on the lids with eye-lashes, radiating with divergent pencil-strokes, which form with them a most delightful contrast, and present a striking consonance with the Sun, after which they seem to have been modelled, having, like that orb, a spherical figure, encircled with divergent rays, in the eye-lashes; having a movement of self-rotation, and possessing the power, like him, of veiling themselves in clouds, by means of their lids.

The same elementary harmonies may be traced in the colours of the head, as well as in it's forms; for we have in the face, the pure white exhibited in the teeth and in the eyes; then the shades of yellow, which dissolve into it's carnation, as the Painters well know; after that the red, the eminently excellent colour, which glows on the lips and on the cheeks. You farther remark the blue of the veins, and sometimes that of the eye-balls; and, finally, the black of the hair which, by it's opposition, gives relief to the colours of the face,

as the vacuum of the neck detaches the forms of the head.

You will please to observe, that Nature employs not, in decorating the human face, colours harshly opposed; but blends them, as she does the forms, softly and insensibly into each other. Thus, the white melts here into the yellow, and there into the red. The blue of the veins has a greenish cast. The hair is rarely of a jet black; but brown, chestnut, flaxen, and, in general, of a colour into which a slight tint of the carnation enters, in order to prevent a violently harsh opposition. You will farther observe, that as she employs spherical segments in forming the muscles which unite the organs, and in order particularly to distinguish these very organs, she makes use of red for the same purposes. She has, accordingly, extended a slight shade of it to the forehead, which she has strengthened upon the cheeks, and which she has applied pure and unmixed to the mouth, that organ of the heart, where it forms a most agreeable contrast with the whiteness of the teeth. The union of this colour, with that harmonic form, is the most powerful consonance of beauty; and it is worthy of remark, that wherever the spherical forms swell, there the red colour strengthens, except in the eyes.

As the eyes are the principal organs of the soul, they are destined to express all its emotions; which could not have been done with the harmonic red tint, for this would have given but one single expression. Nature, in order there to express the contrary passions, has united in the eye the two most opposite of colours, the white of the orbit and the black of the iris, and sometimes of the ball, which form a very harsh opposition, when the globes of the eyes are displayed in the full extent of their diameter; but by means of the eyelids, which Man can contract, or dilate, at pleasure, he is enabled to give them the expression of all the passions, from love to fury.

Those eyes whose balls are blue are naturally the softest, because the opposition, in this case, is less harsh with the adjacent white; but they are the most terrible of all when animated with rage, and this from a moral contrast, which constrains us to consider those as the most formidable of all objects, that menace evil, after having encouraged us to expect good. Persons, therefore, who are thus distinguished, ought to be carefully on their guard against treachery to that character of benevolence bestowed on them by Nature; for blue eyes express, by their colour, something enchantingly celestial.

As

As to the movements of the muscles of the face, it would be extremely difficult to describe them, though I am fully persuaded it might be possible to explain their Laws. Whoever shall attempt this, must of necessity refer them to the moral affections. Those of joy are horizontal, as if the soul, in the enjoyment of felicity, had a disposition to extend itself. Those of chagrin are perpendicular, as if, under the pressure of calamity, the mind was looking toward Heaven for refuge, or seeking it in the bosom of the earth. Into such an explanation of the Laws of muscular motion must likewise enter, the alterations of colours, and the contractions of forms, and in these, at least, we shall discover the truth of the principle which we have laid down, that the expression of pleasure is in the harmony of contraries, blending with each other in colours, forms, and motions; and that the expression of pain consists in the violence of their oppositions. The eyes alone have motions ineffable; and it is remarkable, that, under the influence of very strong emotions, they are suffused with tears, and thus seem to have a farther analogy with the orb of day, who, in the season of tempests, shrouds himself in rainy distillations.

The principal organs of sense, four of which are placed in the head, have particular contrasts, which

detach their spherical forms, by means of radiated forms; and their shining colours by means of dusky tints. Thus the bright organ of vision is contrasted by the eye-brows; those of smell and taste, by the mustaches; the organ of hearing, by that part of the hair called the *favourite* lock, which separates the ear from the face; and the face itself is distinguished from the rest of the head, by the beard, and by the hair.

We shall not here examine the other proportions of the human figure in the cylindric form of the neck, opposed to the spheroid of the head, and to the plane surface of the breast; the hemispherical forms of the paps, which contrast with the flatness of the chest; as well as the cylindrical pyramids of the arms and fingers with the omoplate of the shoulders; the consonances of the fingers with the arms, by means of three similar articulations, with a multitude of other curvatures, and of other harmonies, which, hitherto, have not so much as a name in any language, though they are, in every country, the all-powerful expression of beauty.

The human body is the only one which unites, in itself, the modulations, and the concerts, inexpressibly agreeable, of the five elementary forms, and of the five primordial colours, without exhibiting any thing of the harsh and rude oppositions perceptible

perceptible in the brute creation, such as the prickles of the hedge-hog, the horns of the bull, the tusks of the wild-boar, the fangs of the lion, the marbled skin of the dog, and the livid and disgusting colours of venomous animals. It is the only one of which the first touch is perceptible, and which you can see completely; other animals being disguised under hair, or feathers, or scales, which conceal their limbs, their shape, their skin. Farther, it is the only form which, in its perpendicular attitude, displays all its positions and directions at once; for you can hardly perceive more of a quadruped, of a bird, of a fish, than one half, in the horizontal position which is proper to them, because the upper part of their body conceals the under.

We must, likewise, remark, that Man's progressive motion is subject to neither the shocks, nor the tardiness of movement of most quadrupeds, nor to the rapidity of that of birds; but is the result of movements the most harmonic, as his figure is, of forms, and of colours, the most delightful*.

The

* It has been maintained by certain celebrated Authors, that the Negros consider their own colour as more beautiful than that of the whites; but it is a mistake. I have put many a question, on this subject, to black people, who were in my
own

The more that the multiplied consonances of the human figure are agreeable, the more disgusting are it's dissonances. This is the reason that,
on

own service, in the Isle of France, and who were at perfect liberty to tell what they really thought, especially on a subject so indifferent to slaves, as the beauty of the whites. I sometimes asked them whether of the two they would prefer, a black wife, or a white? They never hesitated an instant in declaring their preference of the white woman: Nay, I have seen a Negro, who had been almost dead alive by the whip, in one of our plantations, express the highest delight when the scars of his sores began to whiten, because it suggested the hope, that he was thereby going to change colour, and to be negro no longer. The poor wretch would gladly have parted with his whole hide to become white. This preference, we shall be told, is, in that case, the effect of the superiority which they are obliged to ascribe to the Europeans. But the tyranny of their masters ought rather to inspire abhorrence of the colour. Besides, the black men and women, of our colonies, express the same tastes that our peasantry at home do, for stuffs of lively and glaring colours. Their supreme luxury in dress is a red handkerchief tied round their head. Nature has bestowed no other tints on the roses of Africa than upon those of Europe.

If the judgment of black slaves is considered as a suspicious authority on the subject, we may refer the decision to the taste of the Sovereigns of Africa, who are under no temptation to dissemble. They fairly acknowledge that in this, as well as in many other respects, they have been more hardly dealt with than the Europeans. African Princes have made frequent application to the Governors of the English, Dutch, and French settlements on the coast, for white women, under a promise of very ample privileges in return. *Lamb*, an English agent at
Aldra,

on the face of the Earth, there is nothing so beautiful as a handsome man, nor so shocking as a very ugly one.

This

Ardra, when prisoner to the King of Dahomay, in the year 1724, sent word to the Governor of the English fort at Juida, that if he could send a white woman, or even a mulatto, to this Prince, she might acquire an unbounded influence over his mind. (*General History of Voyages, by the Abbé Prevost. Book viii. page 96.*)

Another King, on a different part of the coast of Africa, promised, one day, to a Capuchin missionary, who was preaching the Gospel in his presence, to dismiss his seraglio, and embrace Christianity, if he would procure him a white woman to wife. The zealous missionary immediately repaired to the nearest Portuguese settlement; and having enquired, whether there might not be among them some poor and virtuous damsel, such as might suit his purpose, he was informed of such a person, the niece of a very poor man of family, who lived in a state of great privacy. He waited for her one Sunday morning, at the door of the church, as she was returning from mass with her kinsman; and addressing himself to the uncle, before all the people, charged him, in the name of God, and as he valued the interests of religion, that he would bestow his niece in marriage on the Negro King. The gentleman and his niece having given their consent, the black Prince married her, after having dismissed all his other women, and received public baptism. (*History of Ethiopia, by Labat.*)

The best informed travellers relate many such anecdotes, of a similar preference expressed by the black Sovereigns of Africa, and of southern Asia. *Thomas Rowe*, Ambassador from England at the Court of the Mogul *Selim-Scha*, relates, that a very cordial reception was given, by this powerful Monarch, to cer-
tain

This farther suggests a reason why it will be for ever impossible for art to produce a perfect imitation of the human figure, from the difficulty of
uniting

tain Portuguese Jesuits, who had come as missionaries into his dominions, with a view to obtain, through their means, some women of their country to recruit his seraglio. He began with conferring on them singular privileges; had apartments provided for them in the vicinity of his palace, and admitted them to his most intimate familiarity: but perceiving that those good fathers discovered no great inclination to gratify his desires, he practised a very ingenious artifice to draw them into compliance. He expressed an extreme partiality to the Christian Religion; and pretending that he was restrained, merely by reasons of State, from openly embracing it, he gave strict orders to two of his nephews to attend punctually on the catechetical instructions of the missionaries. When the young men had acquired a competent degree of knowledge, he enjoined them to get themselves baptized, and, this being complied with, he thus addressed them: "It is now no longer in your power to marry pagan women, and of this country; for you have made profession of Christianity. It is the duty of the fathers, who baptized you, to procure you wives. Tell them they must send to Portugal for women to be your brides." The young proselytes did not fail to make this demand on the good fathers; who, suspecting that the Mogul's real intention, in marrying his nephews to Portuguese wives, was to procure a supply of white women for his seraglio, refused to engage in this negotiation. Their refusal highly incensed *Selim Schah*, and exposed them to much persecution: he immediately commanded his nephews to renounce Christianity. (*Memoirs of Thomas Rowe, Thevenot's Collection.*)

The black colour of the skin is, as we shall presently see, a
blessing

uniting in it all the harmonies, and from the still greater difficulty of effecting a complete combination of those which are of a different nature. For example, the Painter may succeed tolerably in imitating the colours of the face, and the Sculptor in expressing it's forms. But were an attempt made to unite the harmony of colours and of forms in a single bust, such a production will be very inferior to a mere picture, or to a mere piece of sculpture, because it will combine particular dissonances of colours and of forms, besides their general dissonance, which is still more marked. If

blessing from Heaven to the Nations of the South, because it absorbs the reflexes of the burning Sun under which they live. But the men of those Nations do not the less, on that account, consider white women as more beautiful than the black, for the same reason that they think the day more beautiful than the night, because the harmonies of colours and of lights render themselves perceptible in the complexion of the whites, whereas they almost entirely disappear in that of the blacks, who can pretend to no competition with the others, in point of beauty, except as to form and stature.

The proportions of the human figure, having been taken, as we have just seen, from the most beautiful forms of Nature, are become, in their turn, models of beauty for Man. If we attend to this, we shall find, that the forms which please us most in works of art, as those of antique vases, and the relations of height and breadth in monuments, have been taken from the human figure. It is well known that the Ionic column, with it's capital and it's flutings, was imitated after the shape, the head-dress, and the drapery of the Grecian young women.

to these it were farther attempted to add the harmony of movements, as in the case of an automaton, this would only aggravate the incongruity. Were art to continue it's effort, and try to bestow the gift of speech likewise, this must produce a fourth dissonance, which would be absolutely hideous; for here the intellectual system would clash frightfully with the physical system. It is, accordingly, matter of no surprize to me, that St. *Thomas Aquinas* was so shocked at the speaking head, in constructing which, his master, *Albert the Great*, had employed so many years, that, under the influence of horror, he instantly broke it to shivers. It must have produced on him the same impression which he would have felt, had he heard an articulate voice issuing out of a dead man's mouth. Such labours, in general, do the Artist much honour; but they demonstrate the weakness of art, which falls below Nature just in proportion as it aims at uniting more of her harmonies. Instead of blending them, as Nature herself does, art can only place them in opposition.

All this proves the truth of the principle which we have laid down, namely, that harmony results from the union of two contraries, and discord from their collision: and the more agreeable that the harmonies of an object are, the more disgusting are it's discordances. This is the real origin
of

of pleasure and of dislike, in physics as in morals, and the reason why the same object so frequently excites affection and aversion.

A great variety of very interesting reflections remain to be made on the human figure, especially by connecting with it the moral sensations, which alone give expression to the features. We shall introduce some of these in the sequel of this Work, when we come to speak of sentiment. Be it as it may, the physical beauty of Man is so striking, in the eyes even of the animal creation, that to it, principally, must be ascribed the empire which he exercises over them, in every part of the Earth. The feeble flee for refuge under his protection, and the most powerful tremble at sight of him. *Mathiola* relates, that the lark will save herself amidst troops of men, when she perceives the bird of prey hovering over her. The reality of this instinct was confirmed to me by an officer, who was once an eye-witness of one, in such circumstances, fleeing for safety among a very distinguished squadron of cavalry, in which he then served; but the trooper whose particular protection she sought, trampled her to death under his horse's feet; a most barbarous action, which drew on him, and justly, the indignation of every good man in the corps.

I myself

I myself have seen a stag, when run down by the hounds, appeal, with sobs, for relief, to the compassion of persons accidentally passing that way. *Pliny* relates a similar fact, and it is consistent with my own experience, when I was in the Isle of France, which I have detailed in the journal of my voyage to that Island. I have seen, in the farm-yards, the India-hens, under the impulse of love, go and throw themselves chuckling at the feet of the country-people. If we meet less frequently with instances of the effect of animal confidence in Man, it is because of the noise of our fowling-pieces, scaring them incessantly, and of the continual other persecutions which they are doomed to undergo.

It is well known with what familiarity the monkeys, and fowls of all kinds, approach travellers in the forests of India *. I have seen at the Cape of Good-Hope, in Cape-town itself, the shores of the Sea swarming with water-fowls, which perched confidently on the shallops, and a large wild pelican playing close by the custom-house, with a great dog, whose head she took into her enormous beak. This spectacle conveyed to me, from the moment of my arrival, a most powerful impression

* See *Bernier* and *Mandeflo*.

in favour of the happiness of that country, and of the humanity of its inhabitants : nor did my conjecture deceive me.

But dangerous animals, on the contrary, are seized with terror at the sight of Man, unless they be driven from their natural bias by some pressing necessity. An elephant will suffer himself to be led about, in Asia, by a little child. The African lion retires, growling, from the cabin of the Hottentot ; surrenders up to him the possessions of his ancestors, and seeks for himself a kingdom far remote, in forests, and among rocks, untrodden by the foot of Man. The immense whale, amidst his native element, trembles, and flees away before the puny bark of the Laplander. And thus, to this day, is executed that all-potent Law, which secured empire to Man, though sunk into guilt and wretchedness : “ And the fear of you, and
“ the dread of you, shall be upon every beast of
“ the earth, and upon every fowl of the air ; upon
“ all that moveth upon the earth, and upon all
“ the fishes of the sea ; into your hand are they
“ delivered *.”

It is singularly remarkable, that, through the whole extent of Nature, there is no animal what-

* Genesis, chap. ix. ver. 2.

ever, nor plant, nor fossil, nor even globe, but what has it's consonance and it's contrast out of itself, Man excepted. No one visible being enters into society with him, but either as his servant or as his slave.

We must, undoubtedly, reckon, among the human proportions, that Law so universal, and so wonderful, which produces males and females in equal numbers. Did chance preside over the generation of the human race, as over our alliances, we should one year have an unmixed crop of male children, and another, a race entirely female. Some nations would consist wholly of men, and others, wholly of women; but all over the Globe, the two sexes are born, within the same space of time, equal in number. A consonance so regular, clearly demonstrates, that a Providence is continually watching over the affairs of Mankind, notwithstanding the absurdity and disorder of human institutions. This may be considered as a standing testimony to the truth of our Religion, which, likewise, limits Man to one Woman in marriage, and by this conformity to natural Laws, peculiar to itself, seems alone to have emanated from the AUTHOR of Nature. It may fairly be concluded, on the contrary, that a religion which permits, or connives at, a plurality of wives, must be erroneous.

Ah!

Ah ! how little acquainted are they with the Laws of Nature, who, in the union of the two sexes, look for nothing farther than the pleasures of sense ! They are only culling the flowers of life, without once tasting of it's fruit. The fair sex ! this is the phrase of our men of pleasure ; women are known to them under no other idea. But the sex is fair only to persons who have no other faculty except that of eye-sight. Besides this it is, to those who have a heart, the creative sex which, at the peril of life, carries Man, for nine months, in the womb ; and the cherishing sex, which suckles and tends him in infancy. It is the pious sex which conducts him to the altar while he is yet a child, and teaches him to draw in, with the milk of the breast, the love of a religion which the cruel policy of men would frequently render odious to him. It is the pacific sex, which sheds not the blood of a fellow-creature ; the sympathizing sex, which ministers to the sick, and handles without hurting them.

To no purpose does Man pretend to boast of his power and his strength ; if his robust hands are able to subdue iron and brass, those of the woman, more dextrous, and more usefully employed, can spin into threads the flax and the fleeces of the sheep. The one encounters gloomy care with the maxims of philosophy ; the other

banishes it by sportiveness and gaiety. The one opposes to external evils the force of his reason; the other, far happier, eludes them by the mobility of her's. If the man sometimes considers it as his glory to bid defiance to danger in the field of battle, the woman triumphs, in calmly meeting dangers more inevitable, and frequently more cruel, on her bed, and under the banners of pleasure. Thus, they have been created to support together the ills of life, and to form, by their union, the most powerful of consonances, and the sweetest of contrasts.

I am obliged, by the plan of my Work, to proceed forward, and to refrain from pursuing my reflections on subjects so interesting as the marriage, and the beauty, of Man and Woman. I must, however, hazard some farther observations, extracted from my store, in order to induce others to dive into this rich mine, with the additional value of novelty.

All Philosophers who have made Man their particular study, are agreed, and with good reason, that he is the most wretched of all animals. Most of them appear to have been sensible, that an associate was necessary to him, to relieve his burthens, and they have made his happiness, in part, to consist of friendship; which is an evident demonstration

tion of human weakness and misery; for were Man naturally strong, he would stand in no need of either associate or assistance. Elephants and lions live solitary in the forests. They need no friends, because Nature has made them strong.

It is very remarkable that, when the Ancients give us a representation of perfect friendship, it is always restricted to two, and no more, whatever may be the extent of human weakness; for Man is frequently reduced to the necessity of deriving his felicity from the concurring interposition of many beings similar to himself. Several reasons may be assigned for this restriction, the principal of which are deducible from the nature of the human heart, which, from its very weakness, is capable of attaching itself to only one object at once; and which, being compounded of opposite passions, that maintain a perpetual counterpoise, is, in some sense, both active and passive, and stands in need of loving and of being beloved, of comforting and of being comforted, of honouring and of being honoured, and so on. Accordingly, all the friendships celebrated in the historic page, existed only between two persons; such as those of *Castor* and *Pollux*; of *Theseus* and *Perithoüs*; of *Hercules* and *Iolas*; of *Orestes* and *Pylades*; of *Alexander* and *Hephestion*, and many others.

It is farther to be remarked, that those singular friendships have ever been associated with virtuous and heroic actions; but whenever the union comprehended more persons than two, it was speedily dissolved by discord, or, if permitted to subsist for any length of time, became famous only for the mischief which it brought on Mankind: such was that of the triumvirate among the Romans. In cases when the associates, in such alliances, were still more numerous, the mischief which they did was always in proportion to the greatness of the number of which they consisted. Thus, the tyranny of the Decemviri at Rome exhibited a violence still more cruel than that of the Triumviri, for it spread destruction, we may venture to say, without passion, and in cold blood.

There are, likewise, triummillvirates, and decemmillvirates: these are your various descriptions of Corps. With good reason have they obtained the appellation of *Corps*; for they frequently have a centre distinct from their Country, of which they ought only to be members. They have, likewise, views distinct from those of their Country, a distinct ambition, and distinct interests. They are, with relation to the rest of the citizens, inconstant, detached, destitute of an object, and frequently destitute also, of the spirit of patriotism: that, in a word,

a word, which regular troops are with relation to light troops. They will not suffer them to appear in an avenue along which they themselves are advancing, and dispossess them of the posts which they may have occupied, the whole length of their route. How many revolutions have been effected in Russia by the Strelitzes; in Rome, by the Pretorian guards; at Constantinople, by the Janizaries; and elsewhere, by Corps still more political! Thus, by a just re-action of Providence, the spirit of Corps has been as fatal to countries, as the spirit of Country has itself been to Mankind.

If the heart of Man admits of but a single object, what judgment shall we form of our modern friendships, embracing, as they do, such a multiplicity? Undoubtedly, if a man has thirty friends, he can bestow on each of them only the thirtieth part of his affection, and can receive, in return, no greater proportion of theirs. He must of necessity, therefore, deceive them, and be deceived by them; for no one is disposed to be a friend by fractions.

But, if the truth may be told, such friendships are merely confederacies of ambition; relations interested and purely political, employed entirely in practising mutual illusion, in the view of aggrandizing themselves at the expense of Society; and

which would be productive of unspeakable mischief, were they more clearly united among themselves, and unless they were counterbalanced by opposite confederacies. Almost all our general associations, accordingly, issue in intestine wars. On the other hand, I do not speak of the inconveniencies which result from particular unions, rather too intimate. The most celebrated friendships of Antiquity have not been, in this respect, wholly exempt from suspicion, though, I am persuaded, they were as virtuous as the persons who were the objects of them.

The AUTHOR of Nature has given to each of us, in our own species, a natural friend, completely adapted to all the demands of human life, capable of supplying all the affections of the heart, and all the restlessness of temperament. He says, from the beginning of the World: "It is not good that the man should be alone: I will make him an help meet for him;—and the LORD-God made Woman, and brought her unto the Man*." Woman pleases all our senses by her form and by her graces. She has, in her character, every thing that can interest the heart of Man, and at every stage of human life. She merits, by the long and painful solitudes which she exercises

* Genesis, chap. ii. ver. 18, 22.

over our infancy, our respect as a mother, and our gratitude as a nurse ; afterward, as Man advances to youth, she attracts all his love as a mistress ; and in the maturity of manhood, all his tenderness as a wife, his confidence as a faithful steward, his protection, as being feeble ; and, even in old age, she merits our highest consideration, as the source of posterity, and our intimacy, as a friend who has been the companion of our good and bad fortune through life. Her gaiety, nay, her very caprices, balance, at all seasons, the gravity, and the over-reflective constancy of Man, and acquire, reciprocally, a preponderancy over him.

Thus, the defects of the one sex, and the excess of the other, are an exact mutual compensation. They are formed, if I may use the expression, to be grooved into each other, like the corresponding pieces of carpenters-work, the prominent and retreating parts of which constitute a vessel, fit to launch on the stormy ocean of life, and to attain additional strength from the very buffetings of the tempest. Had we not been informed by a Sacred Tradition, that Woman was extracted from the side of Man ; and though this great truth were not every day manifested, in the wonderful birth of the children of the two sexes, in equal numbers, we should be speedily instructed in it by our wants. Man without the Woman, and Woman
without

without the Man, are imperfect beings, in the order of Nature. But, the greater contrast there is in their characters, the more complete union there is in their harmonies. It is, as we have already briefly hinted, from their oppositions in talents, in tastes, in fortunes, that the most intense and the most durable affection is produced. Marriage is, therefore, the friendship of Nature, and the only real union which is not exposed, like those which exist among men, to estrangement, to rivalry, to jealousies, and to the changes which time is effecting in our inclinations.

But, Wherefore are there so few happy marriages among us? I answer, because with us the sexes have divested themselves each of it's proper nature, and assumed the other. It is because the women, with us, adopt the manners of men, from education; and men the manners of women, from habit. The women have been despoiled of the graces, and of the talents, peculiar to their sex, by the masters, the sciences, the customs, the occupations of men. There is no way left, save one, but that is infallible, to bring both back to Nature; it is to inspire them with a taste for Religion. By Religion, I do not mean attachment to ceremonies, nor systems of Theology; but the religion of the heart, pure, simple, unostentatious; such as it is so beautifully depicted in the Gospel.

Religion

Religion will restore to the two sexes, not only their moral character, but their physical beauty. It is not climate, it is not aliment, it is not bodily exercise, nor all these together, which form human beauty ; it is the moral sentiment of virtue, which cannot subsist independantly of Religion. Aliment and exercise, no doubt, contribute greatly to the magnitude and the expansion of the body ; but they have no manner of influence on the beauty of the face, which is the true physionomy of the soul. It is by no means uncommon to see persons tall and robust disgustingly ugly ; with the stature of a giant, and the face of a monkey.

Beauty of face is to such a degree the expression of the harmonies of the soul, that, in every country, those classes of citizens who are, from their condition, obliged to live with others in a state of constraint, are sensibly the homeliest of the society. The truth of this observation may be ascertained, particularly among the noblesse of many of our provinces, who live with each other in the perpetual jealousy of rank, and with their neighbours of an inferior order, in a state of unremitting hostility, for the maintenance of their prerogatives. Most of those Nobles present a complexion bilious and parched. They are meagre, fulky, and perceptibly uglier than the other inhabitants of the same district, though they breathe the same air,

air, live on the same aliments, and, in general, enjoy a superior degree of fortune. Accordingly, they are far from being gentlemen both in name and in fact. Nay, there is a Nation bordering upon ours, the subjects of which are as much celebrated, all over Europe, for their pride as for their homeliness. All those men are rendered hard-favoured from the same causes that most of our children degenerate in look; who, however amiable in early life, become ugly on going to college, from the miseries and irksomeness of their institutions. I say nothing of their natural character, which undergoes the same revolution with their physionomy; this last being always a consequence of the other,

The same thing does not hold good respecting the noblesse of some other of our provincial districts, and the nobility of other parts of Europe. These, living, as they do, in good understanding among themselves, and with their compatriots, are, in general, the handsomest men of their Nation, because their social and benevolent spirit is not in a state of incessant constraint and anxiety.

To the same moral causes may be referred the beauty of the features of the Greek and Roman physionomies, where we generally meet with models so exquisite, in their statues and medallions. They
were

were beautiful, because they were happy ; they lived in cordial union with their equals, and in the enjoyment of popular favour with the citizens at large. Besides, there were among them no melancholy, moping, monkish institutions, similar to those of our colleges, to disfigure the whole youth of a Nation at once. The descendants of those same Nations are, at this day, far from exhibiting a resemblance to their ancestors, though the climate of their country is not in the smallest degree changed.

It is, farther, to moral causes that we must refer the singularly dignified physiognomies of the great Lords of the Court of *Louis XIV.* as is visible in their portraits. In general, persons of quality being, by their rank, elevated above the rest of the Nation, do not live continually at daggers drawing with each other, and with the other subjects of the State, as is the case of most of our small country-gentlemen. Besides, they are usually educated under the paternal roof, that is, under the blessed influence of domestic enjoyment, and far remote from foreign jealousy and strife. But those of the age of *Louis XIV.* had this distinguished advantage over their posterity, that they were taught to value themselves on beneficence, and popular affability, and on bestowing their patronage upon talents and virtue, wherever they found them.

them. There is not, perhaps, a great Family of that period, but what has the honour to boast of having brought forward, and raised into distinction, some one man of obscure birth, or of the inferior nobility, who afterwards rendered himself illustrious, by means of such support, in arts, in literature, in the church, or in the army.

These grandees acted thus, in imitation of the Sovereign, or, perhaps, from a remainder of the spirit of the magnificence of the feudal government, which then expired. Be this as it may, they were handsome, because they were contented and happy; and this noble emotion of soul toward beneficence, has impressed on their physiognomy a majestic character, which will ever distinguish them from the men of preceding ages, and still more from that which has succeeded.

Observations of this kind are not an object of curiosity merely; they are of much more importance than is generally apprehended; for it follows, as a necessary consequence, that, in order to form in a Nation beautiful children, and, of course, handsome men, in both the physical and moral sense of the word, it is not necessary, according to the doctrine of certain medical men, to subject the human species to regular purgations, and under particular aspects of the Moon. Children restricted
to

to a rigid regimen of this sort, as are most of those of our Physicians and Apothecaries, all present wan pasteboard figures ; and when grown up, pale complexions, and bilious temperaments, like their fathers.

In order to render children beautiful, you must render them physically, but above all, morally happy. You must prevent every possible occasion of vexation to them, not by kindling in their breasts dangerous and headstrong passions, as in the case of spoiled children, but, on the contrary, by teaching them to curb such as they have from Nature, and which society is ever exciting into a state of fermentation ; and especially, by carefully guarding against the communication of every thing unnatural, such as useless and irksome tasks, emulations, rivalships, and the like.....But we shall resume this important subject, at greater length, hereafter.

The ugliness of a child is to be imputed, in almost every case, to his nurse, or to his preceptor. I have sometimes observed, among so many classes of society, more or less disfigured by our institutions, some families singularly beautiful. On enquiring into the cause of this, I have found that those families, though of the commonalty, were happier, in a moral respect, than those of other citizens ;

citizens ; that the mothers had suckled their own children ; that the young people had learned their occupations under the paternal roof and inspection ; that they had been treated with much tenderness and indulgence ; that their parents were fondly attached to each other ; and that they all lived together, notwithstanding the hardships of their low condition, in a state of liberty and cordiality, which rendered them good, happy, and satisfied.

I have thence deduced this other consequence : That we frequently make a false estimate of the happiness of human life. On seeing here a Gardener, with the port of a Roman Emperor ; and there a great Lord, with the mask of a slave, I imagined, at first, that Nature had committed a mistake. But experience demonstrates, that the great Lord in question is, from the hour of his birth to that of his death, placed in a series of positions, which permit him not to gratify his own inclination three times a year. For he is under the necessity, from his infancy upward, to do the will, first of his preceptors and masters ; in more advanced life, that of his prince, of ministers of state, of his rivals, nay, frequently, that of his enemies. Thus, he finds fetters innumerable in his very dignities. Our Gardener, on the other hand, passes his whole life without being exposed to the
slightest

slightest contradiction. Like the Centurion, in the Gospel, he says to his servant, Come, and he cometh; and to another, Do this, and he doeth it. This demonstrates, that Providence has assigned to our very passions a part widely different from that which society presents to them; for, in cases innumerable, the most unrelenting slavery is imposed, together with an accumulation of honours; and, in the meanest of human conditions, we frequently find the possession of the most unbounded empire.

Besides, persons who have been disfigured, by the corruptive impression of vicious education and habits, have it in their power to reform their looks; and I say this, principally, for the sake of our females, who, in order to gain this point, apply white and red, and patch up faces, like those of dolls, utterly destitute of character. After all, they are in the right; for it is much better to conceal character altogether, than to exhibit that of the cruel passions which are often preying upon them; especially to the eyes of so many of the other sex, who study character, merely to take the advantage of it. There are infallible means in their power of acquiring a beauty altogether irresistible. It is to be internally good, gentle, compassionate, sensible, beneficent, and devout. These affections of a virtuous soul will impress on their features

characters altogether celestial, which will appear beautiful, even to the farthest extremity of old age.

Nay, I will venture so far as to affirm, that the harsher the traits may be in homely persons, who have suffered degradation from a faulty education, the more sublime and impressive will be the contrasts produced in them by those which they acquire from habits of virtue; for, when we find goodness under an unpromising exterior, we are as agreeably surprized as at finding violets and primroses under a shrubbery of briars and thorns. Such was the sensation inspired, on a first introduction to the crabbed-looking *M. de Turenne*; and such, in our days, is that which we feel at the first aspect of a certain northern Prince, as justly celebrated for his goodness, as the King, his brother, has rendered himself by his victories. I have no doubt, that the repelling outside of these two great men, may have greatly contributed to give a peculiar prominence to the excellence of their heart. Such, too, was the beauty of *Socrates*, who, with the features of a profligate, delighted every eye, while he discoursed of virtue.

But to no purpose will a man attempt to decorate his countenance with the indications of good qualities, to which his heart is a stranger. This false beauty produces an effect still more disgusting
than

than the most decided ugliness; for when, attracted by an apparent goodness, we actually find dishonesty and perfidy, we are seized with horror, as when we find a serpent lurking in a bed of flowers. Such is the detestable character generally ascribed to courtiers.

Moral beauty, then, is that after which we are bound to aspire, that it's divine irradiations may be diffused over our features, and over our actions. To no purpose will a Prince himself make his boast of high birth, riches, credit, wit; the People, in order to know him, must look him in the face. The People form their judgment of him entirely from the physionomy: it is, in every country, the first, and, frequently, the last letter of recommendation.

OF CONCERTS.

Concert is an order formed of several harmonies of various kinds. It differs from simple order in this, that the last is, frequently, nothing but a series of harmonies of the same species.

Every particular Work of Nature presents, in different kinds, harmonies, consonances, contrasts; and forms a real concert. This we shall more

amply unfold in the Study which treats of plants. It may henceforward be considered as a well-founded remark, on the subject of those harmonies, and of those contrasts, that vegetables, whose flowers have the least lustre, are frequented by animals of the most brilliant colours; and, on the contrary, that the vegetables which are most highly coloured, serve as an asylum to the duskiest animals. This is particularly evident in countries situated between the Tropics; where the trees and herbage, which have few, if any, apparent flowers, lodge and support birds, insects, nay monkeys, of the most lively colours. It is in the plains of India that the peacock displays his gaudy plumage, on shrubbery despoiled of verdure by the burning heat of the Sun. In the same climates it is, that the parrot race, consisting of so many different species, enamelled with a thousand various colours, perch on the gray boughs of the palm-tree, and that clouds of little paroquets, green as the emerald, alight on fields embrowned by the lengthened heats of Summer.

In our temperate regions, on the contrary, most of our birds are dull-coloured, because most of our vegetables have flowers and fruits with shining colours. It is very remarkable, that such of our birds and insects as have lively colours usually choose, for their habitation, vegetables that have
no

no apparent flowers. Thus, the heath-cock glisters on the gray verdure of the pine, whose apples serve him for food. The goldfinch builds his nest in the rough fullers-thistle. The most beautiful of our caterpillars, which is marbled with scarlet, is to be found on a species of the tithymal, that usually grows in the sands, and amidst the quarries of the forest of Fontainbleau. On the contrary, our birds of dusky hue inhabit shrubbery with gay-coloured flowers. The black-headed bullfinch builds his nest in the white-thorn, and that lovely bird exhibits a farther most agreeable consonance and contrast with the prickly shrub where he resides, by his blood-stained breast, and the sweetness of his song. The nightingale, with brown plumage, delights to nestle in the rose-bush, according to the traditions of the oriental Poets, who have founded many a charming fable on the loves of that melancholy bird for the rose.

I could here exhibit a multitude of other harmonies, of a similar nature, respecting the animals both of our own, and of foreign countries. I have collected these to a very considerable number; but, I acknowledge, they are too incomplete to admit of my forming of them the entire concert of one plant. I shall, however, treat the subject more at large, under the article of vegetables. It

will be sufficient, at present, to produce a single example, which incontestably proves the existence of those harmonic Laws of Nature : it is this, that they subsist even in places not exposed to the view of the Sun. We always find, in the cells of the mole, fragments of the bulbous root of the colchica, close by the nest of her young. Now, let any one examine all the plants which usually grow in our meadows, and he will find none which forms more harmonies and contrasts with the black colour of the mole, than the white, impurpled, and lilach-coloured flowers of the colchica. This plant, likewise, furnishes powerful means of defence to the feeble mole against her natural enemy, the dog, who is continually hunting after her in the meadows ; for he is poisoned if he eats it. For this reason, the colchica has obtained the trivial name of dog-bane. The mole, then, finds a supply of food for her necessities, and a protection against her enemies, in the colchica, as the bullfinch does in the white thorn. Such harmonies are not only very agreeable objects of speculation, but may be turned to very good practical account ; for, from what has just been suggested, it will follow, that if you wish to allure the bullfinch to your shrubbery, you have only to plant the white thorn ; and if you would clear your grounds of the mole, exterminate the bulbs of the colchica.

If

If to each plant are added it's elementary harmonies, such as those of the season when it appears ; of the soil and situation in which it vegetates ; the effects of the dews, and of the reflexes of the light on it's foliage ; the movements which it undergoes from the action of the winds ; it's contrasts and consonances with other plants, and with the quadrupeds, the birds, and the insects, which are peculiar to it ; and you will perceive a delightful concert formed all around, the harmonies of which are still unknown to us. It is only, however, by pursuing this track, that we shall be enabled to obtain a glimpse of the immense and magnificent edifice of Nature. I would earnestly intreat Naturalists, persons fond of gardening, Painters, nay, Poets likewise, thus to prosecute their studies, and to make frequent draughts from this perennial spring of taste and of delight. They will behold new worlds arising into view, and, without removing from their own Horizon, they will make discoveries infinitely more curious than those which are contained in our books and cabinets, where the productions of the Universe are frittered away, and disjoined, in the petty drawers of our mechanical systems.

I know not, at present, what name I ought to give to the conformities which those particular concerts have with Man. Certain it undoubtedly

is, that there is no Work of Nature but what strengthens it's particular concert, or, if you will, it's natural character, by the habitation of Man ; and which does not communicate, in it's turn, to the habitation of Man, some expression of grandeur, of gaiety, of terror, or of majesty. There is no verdant mead but what is rendered more cheerful by a dance of shepherdesses and their swains ; and no tempest but what acquires additional horror from the shipwreck of a vessel. Nature raises the physical character of her Works to a sublime moral character, by collecting them around mankind. This is not the place to descant at large on the new order of sentiments hereby suggested. I satisfy myself, at present, with observing, that she not only employs particular concerts to express, in detail, the characters of her Works ; but when she means to express these same characters on the great scale, she combines a multitude of harmonies and of contrasts of the same kind, in order to form of them one great general concert, which has only a single expression, let the field of representation be ever so extensive.

Thus, for example, in order to express the maleficent character of a venomous plant, she combines in it clashing oppositions of the forms and colours which are the indications of that maleficence ; such as retreating and bristly forms, livid colours,

colours, dark greens, with white and black spots, virulent smells....But when she means to characterize a whole district that is unwholesome, she collects a multitude of similar dissonances. The air is loaded with thick fogs, the turbid waters exhale only nauseous smells, no vegetable thrives on the putrid soil but such as are disgusting, the dracunculus, for instance, the flower of which exhibits the form, the colour, and the smell of an ulcer. If any tree arises in the cloudy atmosphere, it is the yew only, whose red and smoky trunk has the appearance of having passed through the fire, and whose gloomy foliage serves as an asylum only to owls. If any other animal is to be found seeking a retreat under its lurid shade, it is the blood-coloured centipede, or the toad crawling along the humid and rotten ground. By these, or similar signs, Nature scares Man away from noxious situations.

If she intends to give him, at sea, the signal of an impending tempest; as she has opposed, in ferocious animals, the fiery glare of the eyes to the thickness of the eye-brows; the stripes and spots with which they are marked to the yellow colour of their skin, and the stillness of their movements to the thundering noise of their voices; she collects, in like manner, in the sky, and on the deep, a multitude of clashing oppositions, which, in concert, announce approaching devastation.

Dark

Dark clouds sweep through the air in the horrible forms of dragons. Here and there the pale fire of lightning bursts from the gloom, the noise of the thunder, with which their dark womb is impregnated, resounds like the roaring of the celestial lion. The Orb of Day, who can scarcely render himself visible through their rainy and multiplied veils, emits long radiations of a wan and sickly light. The leaden surface of the Ocean sinks and swells into broad white foaming surges. A hollow murmuring noise seems to issue from those threatening billows. The black shallows whiten at a distance, with horrid sounds, from time to time, interrupted by ominous silence. The Sea, which alternately covers and reveals them, displays to the light of day their cavernous foundations. The Norwegian lorn perches on one of their craggy points, uttering lamentable cries, like those of a drowning man. The sea-ospray rises aloft in the air, and not daring to commit herself to the impetuosity of the winds, struggles, with a plaintive screaming voice, against the tempest, which bends back her stubborn wings. The black procellaria flutters about, grazing the foam of the waves, and seeks, in the cavity of their moving valleys, a shelter from the fury of the winds. If this small and feeble bird happens to perceive a ship in the midst of the Sea, he flees for refuge along her side, and, as a reward for the protection which he solicits, announces

announces the tempest to the mariner before it overtakes him.

Nature uniformly proportions the signs of destruction to the magnitude of the danger. Thus, for example, the signs of tempest off the Cape of Good-Hope far exceed those on our coasts. The celebrated *Vernet*, who has exhibited so many terrifying representations of the Sea, is far from having depicted all the horrors of the watery element. Every storm has its peculiar character, in every particular latitude. Far different are the storms off the Cape of Good-Hope, from those off Cape Horn; those of the Baltic from those of the Mediterranean; those on the banks of Newfoundland from those on the coast of Africa. They farther differ, according to the season of the year, and even according to the hour of the day. Those of Summer are very unlike those of Winter; and widely different is the spectacle of an enraged sea, shining at noon-day under the rays of the Sun, and that of the same sea illuminated, at the midnight hour, by a single flash of lightning. But you perceive, in all, the clashing oppositions of which I have made mention.

I have remarked one thing, in the tempests off the Cape of Good-Hope, which strikingly supports all that I have hitherto advanced, respecting
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the principles of discord and harmony ; and which may, perhaps, suggest profound and useful reflection to some one of greater ability than I can pretend to. It is this, That Nature frequently accompanies the signs of the disorder which agitates the Ocean, with agreeable expressions of harmony, that serve only to redouble the horror of the scene.

Thus, for example, in two different storms to which I was exposed in those seas, I did not see the face of Heaven obscured by dark clouds, nor these clouds furrowed by alternate flashes of lightning, nor a sea muddy and lead-coloured, as in the tempests of our climates. The sky, on the contrary, presented a fine blue, and the sea a beautiful azure ; there were no other clouds hovering in the air, but small aggregations of a ruddy vapor, dark toward the centre, and illuminated, about the extremities, with the yellow lustre of burnished brass. They took their departure from a single point in the Horizon, and travelled across the Heavens with the rapidity of a bird flying. When the thunder shivered in pieces our main-mast, in the middle of the night, it did not roll ; and emitted only a crack resembling that of a cannon, shot off close by us. Two other thunder-claps, which had preceded this one, were exactly similar. This was in the month of June, which is mid-winter at the Cape of Good-Hope.

I was

I was caught in another storm, when doubling the Cape, on my return, in the month of January, which is mid-summer in that part of the world. The ground of the Heavens was blue, as in the first, and not above five or six clouds were perceptible above the Horizon ; but each of them, white, black, cavernous, and of an enormous magnitude, resembled a portion of the Alps suspended in the air. This last was much less violent than the former, with it's small ruddy vapours. In both, the sea was of the same beautiful azure colour with the sky ; and, on the curling crests of the vast billows, rushing like so many cascades, were formed bright coloured rainbows.

These tempests, in the full blaze of light, are inexpressibly tremendous. The soul stands aghast at sight of the indications of tranquillity converted into signs of storm ; the unclouded azure in the Heavens, and the rainbow playing upon the waves. The principles of harmony appeared to be completely inverted. Nature seemed to have put on a character of perfidiousness, and to conceal fury under the mask of benevolence.

The shallows of those Latitudes exhibit similar contrasts. *John-Hugo de Linschotten*, who saw those of the Jewels, at no great distance, in the Mosambique channel, and upon which he was in extreme danger

danger of making shipwreck, informs us, that they have a most hideous aspect, being black, white, and green. Thus Nature increases the characters of terror, by intermingling with them certain agreeable expressions.

There is a farther observation, of essential importance, to be made in this place; namely, that in those awful scenes of danger and affright, the terrible is close upon you, and the agreeable is removed to an immense distance; tumult is in the seas, and serenity in the sky. A prodigious extension is thus given to the sentiment of disorder; for there is no apparent boundary set to tempests of this sort. All depends on the first impulsion which we undergo. The sentiment of infinity that is within us, and which is ever making new efforts to propagate itself farther and farther, seeks to make it's escape from the physical evil where-with it is surrounded; but repelled, in some sort, by the serenity of the treacherous Horizon, falls back upon itself, and undergoes a severer pang, under the pressure of present painful affections, because their source has the appearance of being invariable.

Such is the Giant of Storms, stationed by Nature at the entrance of the Seas of India, and so well delineated by the pencil of *Camoëns*. Nature,
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in our climates, produces quite contrary effects, for, during Winter, she redoubles our repose within doors, by covering the face of Heaven with dark and rainy clouds. All depends, as I have just said, on the first impulsion which the soul receives. *Lucretius* is, undoubtedly, right in saying, that our pleasure and security, on shore, are greatly increased by the sight of a storm at sea.

A Painter, accordingly, who wished to strengthen, in a picture, the effect of a beautiful landscape, and the felicity of it's inhabitants, would only have to represent, in the back-ground, a vessel at the mercy of the winds, and of the raging deep : the happiness of the shepherds would, in this case, be powerfully heightened by contrast with the distress of the mariners. But if it were his intention, on the contrary, to augment the horrors of a tempest, it would be necessary for him to place, in opposition to the distress of the mariners, the felicity of the shepherds ; and, for this effect, the vessel must be introduced between the spectator and the landscape. The first sentiment depends on the first impulsion ; and the ground contrasting with the scene, is so far from being a deviation from Nature, that the leading object is impressed with additional energy, by being thrown back upon itself. Thus, it is possible, with the same objects placed

placed differently, to produce directly opposite effects.

If Nature, by introducing certain agreeable harmonies into scenes of discord, redoubles their confusion, such as the green colour of the rocks of the Jewels, or the azure, in the tempests off the Cape, she frequently throws in a discordance, in concerts the most delightful, for the purpose of heightening the pleasurable effect. Thus, a noisy water-fall precipitating itself into a tranquil valley; or a rugged and dusky rock ascending in the midst of a verdant plain, enhances the beauty of a landscape. Thus a mole on a beautiful face gives it additional vivacity. Skilful Artists have sometimes happily imitated those harmonic contrasts. *Callot*, when he intended to aggravate the horror of his infernal scenery, introduced, amidst his demons, the head of a fine woman on the carcass of an animal. On the contrary, the most renowned Grecian Painters, in order to render *Venus* more interesting, represented her with a slight squint in her eyes.

Nature employs offensive contrasts only for the purpose of chasing Man away from some perilous situation. In all the rest of her Works, she employs only harmonic mediums. I must not involve myself

myself in the examination of their different concerts ; it is a subject whose riches are inexhaustible. All that could be expected from my scanty fund was the indication of a few of their principles. I shall endeavour, however, to trace a slight sketch of the manner in which she harmonizes the common fields of our harvests, these, being the production of human agriculture, seem abandoned to the monotony that characterizes most of the Works of Man.

First of all, it is remarkable, that we here find that charming shade of green, produced by the alliance of the two primordial opposite colours, which are the yellow and the blue. This harmonic colour decomposes itself, in its turn, by another metamorphosis, toward the time of the harvest, into the three primordial colours, namely, the yellow of the ripening corn, the red of the wild poppy, and the azure of the blue-bottle. These two plants are found intermingled with the standing corn, all over Europe, let the farmer take what pains he may in sifting the grain, and weeding his field. They form, by their harmony, a very rich purple tint, which rises admirably on the yellow ground of the corn-field.

If you study these two plants separately, you will find between them a variety of particular

contrasts ; for the blue-bottle has narrow and slender leaves ; but those of the poppy are broad, with deep incisions. The blue-bottle has the corolla of it's flowers radiating, and of a delicate azure ; but those of the poppy are large, and of a deep red. The blue-bottle throws out divergent stalks ; but those of the poppy are straight. We find, besides, among the corn, the cockle, or corn-rose, which rises to the height of the expanded ear, with handsome purple flowers, in form of a trumpet ; and the convolvulus, with a flesh-coloured flower, crawling up along the reeds, and surrounding them with verdure, like a thyrsus. There is a great variety of other vegetables usually to be found growing among corn, and forming contrasts the most agreeable, most of them exhale the sweetest perfumes ; and, when agitated by the Summer's breeze, you would be disposed, from their undulations, to imagine the whole a sea of verdure enamelled with flowers. Add to all the rest a gentle rustling of the ears against each other, most agreeably soothing, which, by it's soft murmuring sound, invites to sleep.

These lovely forests of vegetable beauty are not destitute of inhabitants. You see bustling about under their shade, the green-coated scarab, streaked with gold, and the monoceros, of the colour of burnt coffee. This last insect takes delight in a hillock

of

of horse-dung, and is furnished with a ploughshare on his head, with which he removes the ground like a labourer. There are, besides, a variety of charming contrasts in the bees and the butterflies, which are attracted by the flowers of the corn-field, and in the manners of the birds which inhabit them. The far-travelled swallow is continually skimming along their surface, undulating like the waters of a lake; whereas the stationary lark towers above them, in a perpendicular direction, within sight of her nest. The domesticated partridge, and transitory quail, there find a situation equally favourable to both, for rearing their young. The hare frequently burrows in their neighbourhood, and quietly nibbles the wild-thistle.

These animals have, with Man, relations of utility, from their fruitfulness and their furs. It is remarkable, that they are to be found over all the corn-districts of Europe, and that their species are varied, according to all the variety of human habitation; for there are different species of quails, partridges, larks, swallows, and hares, adapted to the plains, to the mountains, to the heaths, to the meadows, to the forests, and to the rocks.

As to the corn-plant itself, it has relations innumerable with the wants of Man, and of his domestic

meftic animals. It is neither too high nor too low for his ftature. It is eafily handled and reaped. It furnifhes grain to his poultry, bran to his pigs, forage and litter to his black cattle and his horfes. Every plant that grows in his corn-field poffeffes virtues particularly adapted to the maladies incident to the condition of the labouring-man. The poppy is a cure for the pleurify ; it procures fleep ; it ftops hemorrhages and fputting of blood. The blue-bottle is a diuretic ; it is vulnerary, cordial, and cooling ; it is an antidote to the ftings of venomous infects, and a remedy for inflammation of the eyes. Thus the husbandman finds all needful pharmacy, in the field which he cultivates.

The culture of this ftaff of life difclofes to him many other agreeable concerts with his fleeting exiftence. The direction of it's fadow informs him of the hour of the day ; from it's progrefive growth he learns the rapid flight of the feafons : he reckons the flux of his own fugitive years, by the fucceffions of the guiltlefs harvefts which he has reaped. He is haunted with no apprehenfion, like the inhabitants of great cities, of conjugal infidelity, or of a too numerous pofterity. His labours are always furpaffed by the benefits of Nature. When the Sun gets to the fign of Virgo, he fummons his kindred, he invites his neighbours, and marches at their head, by the dawning of
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of the day, with fickle in hand, to the ripened field. His heart exults with joy as he binds up the swelling sheaves, while his children dance around them, crowned with garlands of blue-bottles and wild poppies. Their harmless play recalls to his memory the amusements of his own early days, and of his virtuous ancestors, whom he hopes, at length to rejoin in a better and happier World. The sight of his copious harvest demonstrates to him that there is a GOD; and every return of that joyous season, bringing to his recollection the delicious eras of his past existence, inspire him with gratitude to the Great Being who has united the transient society of men, by an eternal chain of blessings.

Ye flowery meadows, ye majestic, murmuring forests, ye mossy fountains, ye desert rocks, frequented by the dove alone, ye enchanting solitudes, which charm by your ineffable concerts; happy is the man who shall be permitted to unveil your hidden beauties! but still happier far is he who shall have it in his power calmly to enjoy them in the inheritance of his forefathers!

OF SOME OTHER LAWS OF NATURE, HITHERTO
IMPERFECTLY KNOWN.

There are, besides those which have been mentioned, some physical Laws, not hitherto profoundly investigated, though we have had a glimmering of them, and made them the frequent subject of conversation. Such is the Law of attraction. It has been acknowledged in the planets, and in some metals, as in iron and the load-stone, in gold and mercury. I believe attraction to be common to all metals, and even to all fossils; but that it acts, in each of them, in particular circumstances, which have not hitherto been observed, and ascertained. Each of the metals, perhaps, may have a disposition to turn toward different points of the Earth, as magnetic iron points toward the North, and toward places where there are mines of iron. It would probably be necessary, in order to ascertain this by experiment, that each metal should be armed with its proper attraction; this takes place, as I think, when it is united to its contrary.

How do we know, whether a needle of gold, rubbed with mercury, might not have attractive poles, as a needle of steel has, when rubbed with
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the magnet? Thus prepared, or in some other way adapted to it's nature, it might possibly indicate the places which contain mines of that rich metal. Perhaps it might determine the general points of direction to the East or to the West, which might serve as an indication of the Longitudes, more steadily than the variations of the magnetic needle.

If there be a point at the Pole, on which the Globe seems to revolve, there may, possibly, be one under the Equator, from which it's rotatory motion has commenced, and which may have determined it's motion of rotation. It is very remarkable, for example, that all seas are filled with univalve shell-fish, of an infinity of very different species, which all have their surrounding spirals, in an increasing progression, and in one and the same direction, that is, from left to right, like the motion of the Globe, when the mouth of the shell is turned northward, with the base to the ground. There is only a very small number of species which may be considered as exceptions, and which have, for this very reason, been denominated *unique* (singular, or extraordinary). The spirals of these circulate from right to left.

A direction so general, and exceptions so particular in univalve shell-fish, undoubtedly have
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their causes in Nature, and their epochas, in the unknown ages when their germs were created. It is impossible that they should proceed from the actual influence of the Sun, who acts on them in a thousand different aspects. Can they have been thus directed in a conformity to some general Current of the Ocean, or to some unknown attraction of the Earth, toward the North or the South, toward the East or the West? These relations will appear strange, and perhaps frivolous, to our men of Science; but every thing in Nature is a series of concatenation. A slight observation here, in many cases, leads to important discovery. A small plate of iron turning toward the North, guides a whole Navy through the deserts of the Ocean; and a reed of an unknown species, thrown on the coast of the Azores, suggested to *Christopher Columbus* the existence of a western World.

Whatever may be in this, certain it is, that there exists a great number of those particular points of attraction, scattered over the Earth, such as the matrices which renovate the mines of metals, by attracting to themselves the metallic parts dispersed in the elements. It is by means of attractive matrices, that those mines are inexhaustible, as has been remarked in many places, among others, in the Isle of Elba, situated in the Mediterranean. This little island is entirely a mine

mine of iron, from which had been already extracted, in the time of *Pliny*, an immense quantity of that metal, without it's being perceptible, as he tells us, that it was in the smallest degree diminished. Metals have, besides, other attractions; and if I might presume to deliver my opinion by the way, I consider these themselves as the principal matrices of all fossil bodies, and as the ever active means employed by Nature for repairing the mountains and the rocks, which the action of the other elements, but, especially, the injudicious labours of men, have an incessant tendency to impair.

I shall here remark, on the subject of mines of gold, that they are placed, as well as those of all metals, not only on the most elevated part of Continents, but in icy mountains.

The celebrated gold mines of Peru, and of Chili, are, it is well known, in the Cordeliers. The gold mines of Mexico are situated in the vicinity of Mount St. Martha, which is covered with snow all the year round. The rivers of Europe, which wash down particles of gold along their shores, issue from icy mountains. The Po, in Italy, has it's source in those of Piedmont. But without quitting France, we reckon ten greater or smaller rivers, which roll along gold-dust, intermingled

mingled with their sands, and which have all of them their origin in mountains of ice. Such is the Rhine, from Straßburg to Philipßburg; the Rhone, in the Païs de Gex; the Doux, in Franche-Comté, which three all take their rise in the icy mountains of Switzerland. The Cese and the Gardon descend from those of the Cevennes. The Ariège, in the Païs de Foix; the Garonne, in the vicinity of Tholouse; the Salat, in the County de Conserans; and the rivulets of Ferriet and Benagues, all take their rise in the icy mountains of the Pyrennées.

This observation may be extended, I believe, to all the gold mines in the World, even to those of Africa, such of whose rivers as wash down the greatest quantities of gold-dust, the Senegal, for instance, descend from the mountains of the Moon.

To this it may be objected, that gold was formerly found in Europe, in places where there were no icy mountains; nay, that some has been picked up on the surface of the ground, as in Brasil; and not many years ago, that there was found an ingot, or mass, of several pounds weight, on the bank of a river in the district of Cinaloa, in New-Mexico. But, if I might venture to hazard a conjecture, respecting the origin of this gold,

gold, scattered about on the surface of the earth, in the ancient Continent of Europe, and especially in that of the New-World; I believe it to have proceeded from the total effusions of the ices of the mountains, which took place at the time of the Deluge; and that, as the spoils of the Ocean covered the western parts of Europe, that those of vegetable earths were spread over the eastern part of Asia, those of minerals, from the mountains, were forced along other countries, where their fragments were found, in the earlier ages, in grains, and even in larger masses.

This much is certain, that when *Christopher Columbus* discovered the Lucayo and Antilles islands, he found among those islanders abundance of gold of a base alloy, the produce of the traffick which they carried on with the inhabitants of the Continent; but they had no mines within their own territory, notwithstanding the prejudice then entertained, and under which many labour to this day, that the Sun formed this precious metal in the earth of the Torrid Zone. For my own part, I find, as I have just observed, gold much more common in the vicinity of icy mountains, whatever their Latitude may be; and I conjecture, from analogy, that there must be very rich mines of it in the North. It is extremely probable, that the waters of the Deluge hurled along considerable

siderable portions of that metal to the northern countries,

We read, I think, in the Book of Job, the Arabian, this remarkable expression; "Gold cometh from the North." * Certain it is, that the first commerce of India with Europe was carried on by the North, as has been clearly demonstrated by the Baron *de Strahlenberg*, a Swedish exile, after the battle of Pultowa, in Siberia, of which he has given a very intelligent and accurate description. He says, that it is still possible to pursue, by evident traces, the track of the ancient Indians along the river of Petzora, which empties itself into the White Sea. On it's banks, in various places, are found many of their tombs, which contain, some of them, manuscripts on silk stuffs, in the language of *Thibet*; and there are perceptible, on the rocks along it's shores, characters which they

* This is not entirely of a piece with our Author's usual accuracy. It is written, indeed, in the Book of Job, chap. xxxvii. ver. 9. "*Cold* cometh out of the North;" and ver. 22. "*Fair weather* cometh out of the North:" but no where in Scripture, so far as I know, is this affirmed of *Gold*. *St. Pierre* seems to have quoted from general and indistinct recollection; happy, no doubt, to have, as he thought, a text from the Bible to support his conjecture. But, notwithstanding this defect, his reasoning is plausible, and the human testimony which he adduces respectable.

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have traced upon them, in a red which cannot be effaced. From this river they forced their way through the lakes, by means of leathern boats, to the Baltic; or coasted along the northern and western shores of Europe.

This track was known to the Indians, even from the time of the ancient Romans; for *Cornelius Nepos* relates, that a King of the Suevi made a present to *Metellus Celer* of two Indians, who had been thrown, by stress of weather, with their leathern canoe, on the coasts adjacent to the mouth of the Elbe. It is not easy to conceive what those Indians, the inhabitants of a warm country, were going in quest of, so far to the North. What use could they have made, in India, of the furs of Siberia? It would appear they went thither in search of gold, which might then be frequently discoverable to the North, at the surface of the earth.

Whatever may be in this, it is presumable that, as mines of gold are placed in the most elevated regions of the Continent, their matrices collect, in the Atmosphere, the volatilized particles of gold, which ascend thither with the fossil and aquatic emanations, conveyed by the winds from every quarter. But they exercise over men, attractions still much more powerful.

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It would appear as if Nature, by burying the focuses of this rich metal under the snows, had intended to fence it with ramparts still more inaccessible than the flinty bosom of the rock, lest the undismayed ardor of human avarice should, at length, destroy them entirely. It has become the most powerful bond of society, and the perpetual object of all the labours of a life so rapidly hurrying to a close. Alas! were Nature, at this day, to inflict condign punishment on this insatiable thirst in the Nations of Europe, for a metal so useless, as a real necessary of human life, she has only to change the territory of some one of them into gold. Every other Nation would instantly flock thither, and, in a little time, exterminate it's wretched inhabitants. The Peruvians and Mexicans have had the dreadful experience of this.

There are metals not so highly prized, but much more useful, the elementary attractions of which might, perhaps, procure us very important accommodations.

The peaks of the mountains, and their lengthened crests, are filled, as we have seen, with iron or copper, intermingled with a vitreous body, of granite, or of natural crystal, which attracts the rains and the stormy clouds, like so many real electric

electric needles. There is not a seaman but what has seen, a thousand times, those peaks, and those crests, covered with a cloudy cap, gathered round and round, and concealing them entirely from view, without once suspecting the cause of this appearance. Our Philosophers, on the other hand, deducing their conclusions merely from the inspection of charts, have taken those rocky protuberances for the wrecks of a primitive earth, without giving themselves any trouble about their effects.

They ought to have observed, that those metallic pyramids and crests, as well as most mines of iron and copper, are always to be found in elevated situations, and at the source of all rivers, of which they are the primitive causes, by means of their attractions. Their general inattention to this subject is thus only to be accounted for; seamen observe, and do not reason; and the learned reason, but do not observe. Undoubtedly, had the experience of the one been united to the sagacity of the other, prodigies of discovery might have been expected.

I am persuaded that, in imitation of Nature, it might be possible for us to acquire the art of forming, by means of electric stones, artificial fountains, which should attract the rainy clouds in
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parched and dry situations, as chains and rods of iron attract thunder-clouds. It is true, that Princes must be at the expense of such costly and useful experiments; but it is the way for them to immortalize their memory. The *Pharoahs*, who built the pyramids of Egypt, would not have drawn upon themselves the curses of their subjects, as *Pliny* assures us they did, for their enormous and useless labours, had they reared, amidst the sands of Upper Egypt, an electrical pyramid, which might there have formed an artificial fountain. The Arab who should resort thither, at this day, to quench his thirst, would still pronounce benedictions on names which, if we may believe the great Natural Historian, had already sunk into oblivion, and ceased to be mentioned, in his time.

For my own part, I think that several metals might be proper for producing similar effects. An officer of high rank, in the service of the King of Prussia, informed me that, having remarked vapors to be attracted by lead, he had employed it's attraction for drying the atmosphere of a powder-magazine. This magazine was constructed under ground, in the throat of a bastion, but had been rendered of no use whatever, from it's humidity. He ordered to line with a coat of lead the concave ceiling of the arch, which was before planked
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over, where the gunpowder was deposited in barrels: the vapors of the vault collected in great drops, on the leaden roof, run off in streamlets along the sides, and left the gunpowder barrels perfectly dry.

It is to be presumed that every metal, and every fossil, has it's peculiar repulsion as well as it's attraction; for these two Laws always go hand in hand. Contraries seek out each other.

There are, farther, a multitude of other harmonic Laws, as yet undiscovered; such are the proportions of magnitudes, and of the durations of existence, in beings vegetative and sensible, which differ exceedingly, though their nutriment and climates may be the same. Man, while yet a youth, sees the dog, his companion and contemporary, die of old age; and also the sheep, which he fondled when a lamb. Though the former lived at his own table, and the other on the herbage of his meadow, neither the fidelity of the one, nor the temperance of the other, was able to prolong their days; whereas animals which live only on carrion and garbage, live for ages, as the crow. It is impossible to guide ourselves in prosecuting such researches, any other way than by following the spirit of conformity, which is the

basis of our own reason, as it is that of the reason of Nature.

By consulting this, we shall find, that if such and such a carnivorous animal is long-lived, as the crow for instance, it is because his services and his experience are long necessary for purifying the earth, in places whose impurities are incessantly renewing, and which are frequently at great distances from each other. If, on the contrary, an innocent animal lives but a little while, it is because his flesh and his skin are necessary to Man. If the domestic dog, by his death, frequently diffuses sorrow over the children of the family, whose intimate friend and fellow-boarder he was, Nature, undoubtedly, intended to give them, in the loss of an animal so worthy of the affections and the regret of the heart of Man, the first experience of the privations with which human life is to be exercised.

The duration of an animal's life is sometimes proportioned to the duration of the vegetable on which it feeds. A multitude of caterpillars are born, and die with the leaves by which their transitory existence is supported. There are insects whose being is limited to five hours; such is the ephemera. This species of fly, about half as large

as the tip of the little finger, is produced from a fluviatic grub, which is found particularly at the mouths of rivers, close by the water's edge, in the mud, into which it digs in quest of subsistence. This grub lives three years, and at the termination of that period, about Midsummer-day, it is transformed, almost instantaneously, into a fly, which comes into the world at six o'clock in the evening, and dies about eleven at night. No longer space of time is necessary for copulation, and for depositing the eggs on the mud which the water has deserted.

It is very remarkable, that this insect copulates, and lays her eggs, precisely at the time of the year when the tides are at the lowest, when the rivers discover, at the place of their discharge, the greatest part of their channel dry. Wings are then furnished, to enable her to go and deposit her eggs in places which the waters forsake, and to extend, in the capacity of a fly, the domain of her posterity, at the time when, as a worm, her territory is most contracted. I have likewise remarked, in the microscopic drawing and dissections given of this insect by the ingenious *Thevenot*, in the last parts of his collection, that in her fly state, she has neither interior nor exterior organs of nutrition. They would have been entirely useless to a life of such transient duration.

Nature has made nothing in vain. It is not credible that she should have created momentary lives, and beings infinitely minute, to fill up imaginary chains of existence. The Philosophers who ascribe to her these pretended plans of universality, which are destitute of every shadow of proof, and which make her descend into the infinitely small, for purposes equally frivolous, would represent her as acting somewhat like a mother, who gives, as toys to amuse her children, tiny coaches, and minute articles of household furniture, of no use in the world, but which are imitations of domestic utensils.

The aversions and the instincts of animals emanate from Laws of a superior order, which we shall never be able to penetrate into in this world; but, supposing those intimate conformities to elude our researches, they must be referred, like every other, to the general conformity of beings, and especially to that of Man. There is nothing so luminous in the study of Nature, as to refer every thing that exists to the goodness of GOD, and to the demands of humanity. This method of viewing objects not only discovers to us a multitude of unknown laws, but it sets bounds to those which we do know, and which we believe to be universal.

If

If Nature, for example, were governed by the Laws of attraction only, according to the supposition of those who have made it the basis of so many systems, every thing in it would be in a state of rest. Bodies, tending toward one common centre, would there accumulate, and arrange themselves round it, in the ratio of their gravity. The substances which compose the Globe, would be so much heavier as they approached nearer to the centre, and those which are at the surface, would all be reduced to a level. The basin of the Seas would be choked with the wrecks of the Land; and this magnificent architecture, formed of harmonies so various, would soon become an aquatic Globe entirely. All bodies hurled downward by one common precipitation, would be condemned to an everlasting immobility.

On the other hand, if the Law of projection, which is employed for explaining the motions of the heavenly bodies, on the supposition that they have a tendency to fly off in the tangent of the curve which they describe; if, I say, this Law predominated, all bodies, not actually adherent to the Earth, would be hurled from it, like stones from a sling: our Globe itself, subjected to this Law, would fly off from the Sun never to return. It

would sometimes traverse, in it's unbounded career, the spaces of immensity, where no star would be perceptible during the course of many ages; sometimes, swinging through regions where chance might have collected the matrices of Creation, it might pass along amidst the elementary parts of Suns, aggregated by the central Laws of attraction, or scattered about in sparks and in rays, by those of projection.

But, on the supposition that these two contrary forces were combined happily enough in favour of the Globe, to fix it, with it's vortex, in a corner of the firmament, where these forces should act without destroying themselves, it would present it's Equator to the Sun with as much regularity as it describes it's annual course round him. From those two constant motions never could be produced that other motion so varied, by which it daily inclines one of it's Poles toward the Sun, till it's axis has formed, on the plane of it's annual circle, an angle of twenty-three degrees and an half; then that other retrograde motion, by which it presents to him, with equal regularity, the opposite Pole. Far from presenting to him alternately it's Poles, in order that his fertilizing heat may, by turns, melt their ices, it would retain them buried in eternal night and Winter, with

with a part of the temperate Zones, whereas the rest of it's circumference would be burnt up by the too constant fires of the Tropics.

But if we suppose, together with those constant Laws of attraction and projection, a third variable Law, which gives to the Earth the movement, that produces the seasons, and a fourth, which gives it the diurnal motion of rotation round itself; and that no one of these Laws, so opposite, should ever surpass the others, and, at last, determine it to obey but one single impulsion; it would be impossible to affirm, that they had determined the forms and movements of the bodies which are on it's surface. First, the force of projection, or centrifugal, would not have left upon it any one detached body. On the other hand, the force of attraction, or gravity, would not have permitted the mountains to rise, and still less the metals, which are the heaviest part of them, to be placed at their summits, where they are usually found.

If we suppose that those Laws are the *ultimatum* of chance, and that they are so combined, as to form, among themselves, but one single Law; for the same reason that they make the Earth move round the Sun, and the Moon round the Earth, they ought to act in the same manner on the particular bodies which are at the surface of the

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Globe.

Globe. We ought to see the rocks detached, the fruits separated from the trees, the animals which are not provided with claws turning round it in the air, as we see the particles which compose *Saturn's* ring turn round that Planet.

It is the gravity, they repeat, which acts only at the surface of the Globe, that hinders bodies to detach themselves from it. But if it there absorbs the other powers, Wherefore, as we have already asked, did it permit the mountains to rise? How comes it that the centrifugal force should have been able to exalt, to a prodigious height, the long ridge of the Cordeliers, while it has left immoveable the volatile scurf of snow which covers them? For what reason, if the action of gravity is still universal, has it no influence on the soft bodies of animals, when, shut up in the womb of the mother, or in the egg, they are in a state of fluidity? All the numerous progeny of the Earth, animals and vegetables, ought to be rounded into balls, like their mother. The weightiest parts of their bodies, at least, ought to be situated undermost, especially in those which possess self-motion; on the contrary, they are frequently uppermost, and supported by limbs much lighter than the rest of the animal, as in the case of the horse and the ox. Sometimes they are between the head and the feet, as in the ostrich; or at the extremity

mity of the body, in the head, as in the human species. Others, such as the tortoise, are flattened; others, such as reptiles, are drawn out in form of spindles; all of them, in a word, have forms infinitely varied.

Vegetables themselves, which seem entirely subjected to the action of the elements, have configurations diversified without end. But, How comes it that animals have in themselves the principles of so many motions, so entirely different? Wherefore has not gravity nailed them down to the surface of the Earth? They ought to crawl along it at most. How comes it to pass, that the Laws which regulate the course of the Stars; those Laws whose influence has, in modern times, been made to extend even to the operations of the human soul, should permit the birds to rise into the air, and fly as they please to the West, to the North, to the South, notwithstanding the united powers of the attraction, and of the projection of the Globe?

It is conformity, adaptation to use, which has regulated those Laws, and which has generalized, or suspended their effects, in subordination to the necessities of sensible beings. Though Nature employs an infinity of means, she permits Man to know only the end which she has in view. Her Works are subjected to rapid dissolutions; but she

She always suffers him to perceive the immortal consistency of her plans. It is on this she wishes to fix his heart and mind. She aims not at rendering Man ingenious and proud; her object is to render him good and happy. She universally mitigates the evils which are necessary; and universally multiplies blessings in many cases superfluous. In her harmonies, formed of contraries, she has opposed the empire of death to that of life; but life endures for a whole age, and death only an instant. She allows Man long to enjoy the expansions of beings, so delightful to behold; but conceals from him, with a precaution truly maternal, their transient states of dissolution.

If an animal dies; if plants are decomposed in a morass, putrid emanations, and reptiles of a disgusting form, chase us away from them. An infinite number of secondary beings are created for the purpose of hastening forward the decompositions. If cavernous mountains and rocks present appearances of ruin; owls, birds of prey, the ferocious animals, which have made them their retreat, keep us at a distance from them. Nature drives far from us the spectacles and the ministers of destruction, and allures us to her harmonies. She multiplies them, in subserviency to our necessities, far beyond the Laws which she seems to have prescribed to herself, and beyond the measure

sure which we had reason to expect. It is thus that the dry and barren rocks repeat, by their echos, the murmuring sound of the waters and of the forests; and that the plane surfaces of the waters, which have neither forests nor hills, represent their colours and forms by reflecting them.

From a profusion of this unbounded benevolence of Nature it is, that the action of the Sun is multiplied wherever it was most necessary; and is mitigated in all the places where it would have been hurtful. First, the Sun is five or six days longer in our northern Hemisphere, because that Hemisphere contains the greatest part of the Continents, and is the most inhabited. His disk appears in it before he rises, and after he is set; which, added to it's twilights, considerably increases the natural length of our days. The colder that it is, the farther does the refraction of his rays extend. This is the reason that it is greater in the morning than in the evening, in Winter than in Summer, and at the beginning of Spring than at the beginning of Autumn.

When the Orb of Day has left us, during the night season, the Moon appears, to reflect his light upon us, with varieties in her phases which have relations, hitherto unknown, to a great number of species of animals, and especially of fishes, which
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travel only in the night-time, at the epochas which she indicates to them. The farther that the Sun withdraws from one Pole, the more are his rays refracted there. But when he has entirely abandoned it, then it is that his light is supplied in a most wonderful manner. First, the Moon, by a movement altogether incomprehensible, goes to replace him there, and appears perpetually above the Horizon, without setting, as was observed in the year 1596, at Nova Zembla, by the unfortunate Dutchmen who wintered there, in the 76th degree of North Latitude,

It is in those dreadful climates, that Nature multiplies her resources, in order to bestow on sensible beings the benefits of light and heat. The Heavens are there illuminated with the *aurora-borealis*, which darts up to the very zenith rays of moving light, gold-coloured, white, and red. The Poles sparkle with stars more luminous than those which appear in the rest of the firmament. The snows which cover the ground shelter part of the plants, and, by their lustre, dispel the darkness of night. The trees are clothed with thick mosses, which catch fire from the smallest spark; the very ground is covered with them, especially in the woods, to so great a depth, that I have, oftener than once, sunk, in the Summer time, up to the knees, in those of Russia: Finally, the animals,

mals, which inhabit those regions, are robed in fur to the very tip of their claws.

When the season returns for restoring heat to those climates, the Sun re-appears there a considerable time before his natural term. Thus, the Dutch mariners, whom I have just mentioned, saw him, to their astonishment, above the Horizon of Nova Zembla, on the twenty-fourth of January, that is, fifteen days sooner than they expected him. This return, so much earlier than their hopes had fashioned it, filled them with joy, and disconcerted the calculations of their intelligent pilot, the unfortunate *Barents*.

It is then that the Star of Day there redoubles his heat and his light, by means of the parhelions, which, like so many mirrors formed in the clouds, reflect his disk upon the Earth. He calls from Africa the winds of the South, which, passing over Zara, whose sands are then violently heated by the vicinity of the Sun to their Zenith, load themselves with igneous particles, and proceed to attack, like battering rams of fire, that tremendous cupola of ice which covers the extremity of our Hemisphere. It's enormous vaultage, dissolved by the heat of those winds, and loosened by their violent agitations, detaches itself in fragments as lofty as mountains ; and, floating at the discretion
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of the Currents, which sweep them along toward the Line, they advance sometimes as far as to the 45th degree, cooling the Seas of the South, by their vast effusions. Thus the ices of the Pole communicate coolness to the heated seas of Africa, just as the burning sands of Africa transmit warm winds to dissolve the ices of the Pole.

But as cold is, in its turn, a very great blessing in the Torrid Zone, Nature employs a thousand methods to extend the influence of it in that Zone, and to mitigate in it the heat and the light of the Sun. First, she destroys there the refractions of the Atmosphere. There is scarcely any twilight between the Tropics, to precede the rising of the Sun, and still less after his setting. When he is in the Zenith, he veils himself with rainy clouds, which cool the ground, both by their shade and by their showers. Besides, those clouds being frequently impregnated with thunder, the explosion of their fires dilates the superior stratum of the Atmosphere, which is icy at the height of two thousand five hundred fathom, under the Line, as is evident from the snows which perpetually cover, at that height, the summits of some of the Cordelier mountains. They cause to flow down, by their explosions and concussions, columns of that air, congealed in the superior regions of the Atmosphere, into the inferior, which are suddenly cooled

cooled by it, as we feel it to be in our own climates, in Summer, immediately after a thunder storm.

The effusions of the polar ices, in like manner, cool the seas of the South; and the polar winds frequently blow on the hottest parts of their shores. Nature has, farther, placed in the very heart of the Torrid Zone, and in it's vicinity, chains of icy mountains, which accelerate, and redouble the effects of the polar winds, especially along the seas, where fermentation was most to be dreaded, from the alluvions of the bodies of animals, and of vegetables, which the waters are there continually depositing. Thus, the chain of Mount Taurus, eternally covered with snow, commences in Africa, on the burning shores of Zara, and, coasting the Mediterranean, passes on into Asia, where it extends long arms, this way and that, which embrace the gulfs of the Indian Ocean. In America, in the same manner, the extensive chains of the Cordeliers of Peru and Chili, with the elevated ridges in which it crosses Brasil, cools the lengthened and burning shores of the South-Sea, and of the gulf of Mexico.

These elementary dispositions are only part of the resources of Nature, for mitigating the heat in warm countries. She there shades the ground
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with creeping vegetables and trees, in form of a parasol, some of which, such as the cocoa-tree of the Sechelles-islands, and the talipot of Ceylon, have leaves from twelve to fifteen feet long, and from seven to eight feet broad. She clothes the animals of those regions with hairless skins, and colours them, in general, as well as the verdure, with dark and dusky tints, in order to diminish the reflexes of the heat and of the light. This last consideration leads me here to suggest a few reflections on the effects of colours; the little which I shall advance on this subject, will be sufficient to produce conviction, that their generations are not the effect of chance; that it is from reasons profoundly wise we find one half of them proceed, in compounding themselves, toward the light; and in their decomposition, toward darkness; and that all the harmonies of this World are produced by contraries.

Naturalists consider colours as accidents. But, if we attend to the general uses for which Nature employs them, we shall be persuaded that there is not, even on rocks, a single shade impressed without a meaning and a purpose. Let us observe, in the first place, the principal effects of the two extreme colours, white and black, with relation to the light. Experience demonstrates that, of all colours, white is that which best reflects the rays
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of the Sun, because it sends them back without any tint, as pure as it receives them; and that black, on the contrary, is the least adapted to their reflection, because it absorbs them. This is the reason why gardeners whiten the walls against which their espaliers are planted, in order to accelerate the maturity of their fruits, by the reverberation of the Sun's rays; and why opticians blacken the walls of the *camera-obscura*, that their reflexes may not disturb the luminous picture on the tablet.

Nature, of consequence, frequently employs to the North the white colour, in order to increase the light and heat of the Sun. Most of the lands there are whitish, or of a clear gray. The rocks and sands of northern regions are filled with mica and specular particles. Farther, the whiteness of the snows, which cover them in Winter, and the vitreous and crystalline particles of their ices, are exceedingly adapted to mitigate the action of the cold, by reflecting the light and heat in the most advantageous manner. The trunks of the birch-trees, of which the greatest part of their forests consist, are covered with a bark as white as paper. Nay, in some places, the earth is clothed with a vegetation completely white.

“ In the eastern part,” says an intelligent Swede,
“ of the lofty mountains which separate Sweden
“ from Norway, exposed to the utmost rigor of the
“ cold, there is a very thick forest, and singular in
“ this respect, that the pine which grows there is
“ rendered black, by a species of filamentous li-
“ chen, which hangs upon it in great abundance ;
“ whereas the ground is covered every where
“ around with a white lichen, which, in lustre,
“ rivals the snow.”*

Nature there bestows the same colour on most animals, such as the white-bear, the wolf, the partridge, the hare, the ermine ; others perceptibly whiten to a certain degree in Winter, such as foxes and squirrels, which are reddish in Summer, and light gray in Winter. Nay, if we consider the filiform figure of their hair, its varnish and transparency, we shall be sensible that it is contrived in the most proper manner for reflecting and refracting the rays of light. We ought not to imagine this whiteness as a degeneration, or enfeebling of the animal, as Naturalists have done with respect to the human hair, which whitens in old-

* Extract from the Natural History of the rein-deer, by Charles-Frederick Hoffberg, translated by M. le Chevalier de Keralio.

age, as they tell us, from a failure of radical moisture; for nothing can be of a closer contexture than most of those furs, nor any thing more vigorous than the animals which are arrayed in them. The white-bear is one of the strongest and most formidable of animals in the world; it frequently requires several musket-shot to bring him down.

Nature, on the contrary, has tinged with red, with blue, with dusky, and black tints, the soil, the vegetables, the animals, nay, even the men, who inhabit the Torrid Zone, for the purpose of there absorbing the fires of the burning Atmosphere with which they are surrounded. The lands, and the sands of the greatest part of Africa, situated between the Tropics, are of a reddish brown, and the rocks are of a black hue. The Islands of France and of Bourbon, which are on the border of that Zone, are, in general, of the same dark complexion. I have seen there chickens and perroquets, not only whose plumage, but the skin itself, was dyed black. I have likewise seen, in those islands, fishes entirely black, and especially among the species which live near the surface of the water, over the shallows, such as the old-woman and the thornback.

As animals whiten, in Winter, toward the North, in proportion as the Sun withdraws from them,

them, those of the South assume dark and dusky tints, in proportion as the Sun approaches to them. When he is in the Zenith, the sparrows of the tropical countries have breast-plates, and the plumage of the head, completely red. There are birds in those regions which change their colour three times every year, having, if I may use the expression, one dress for Spring, another for Summer, and a third for Winter, according as the Sun is in the Line, in the Tropic of Cancer, or in that of Capricorn *.

* The white colour, accordingly, increases the effect of the rays of the Sun, and the black weakens it. The inhabitants of Malta whiten the inside of their apartments, in order, as they allege, to render the scorpions perceptible, which are very common in that island. In doing this, if I am not mistaken, they commit two errors; the first, in misapprehending the colour: for the scorpions, which there are gray, would appear still better on a dark ground; the second, and one of much greater importance, is their increasing to such a degree the reverberation of the light, that the eye-sight is sensibly affected by it. To this cause I principally ascribe the disorder of the eye so frequently complained of by those islanders. Our trades-people wear white hats, in Summer, when in the country, and complain of headaches. All these evils arise from neglecting to study Nature. In the Isle of France they employ, for wainscoting, the wood of the country, which in time becomes entirely black; but this tint is too gloomy. It seems as if Nature had foreseen, in this respect, the services which Man was to derive from the interior of trees: their timber is brown in most of those of hot countries, and white in those of the northern regions, such as the fir and the birch.

This

This, too, is very remarkable, and of consequential importance to the use which Nature makes of these colours, to the North, and to the South; namely, that in all countries, the whitest part of the body of an animal is the belly, because more heat is wanted there for promoting digestion, and carrying on the other animal functions: and, on the contrary, the head is universally most strongly coloured, especially in those of hot countries, because, in the animal economy, that part stands most in need of being kept cool.

It cannot be maintained, that the bellies of animals preserve their whiteness, because that part of the body is sheltered from the Sun; and that their heads assume strong colouring, from being more exposed to his influence. It might appear, from reasons of analogy, that the natural effect of light ought to be, to invest with it's lustre all the objects which it touches; and that, conformably to this, the soil, the vegetables, and the animals of the Torrid Zone ought to be white; and that darkness, on the contrary, acting for several months together on the Poles, ought to clothe every object, within those regions, in robes of mourning. But Nature subjects not herself to mechanical Laws. Whatever may be the physical effect of the presence of the Sun, or of his absence, she has contrived, toward the North, to impose very black

spots on the whitest bodies, and, to the South, white spots on the darkest bodies. She has blackened the tip of the tail of the Siberian ermine, in order that these little animals, which are white all over, as they march along the snow, where they scarcely leave any traces of their footsteps, may be enabled to distinguish each other, when proceeding in a train, in the luminous reflexes of the long nights of the North.

Perhaps, too, this blackness, opposed to the white, may be one of those decided characteristics with which she has marked beasts of prey; such as the extremity of the black snout, and the black paws of the white-bear. The ermine is a species of weasel. There are, likewise, in the North, foxes completely black; but they are indemnified, for the influence of the white colour, by the warmest and thickest of furs; it is the most valuable of all those of the North. Besides, this species of foxes is very rare, even in those countries. Nature has, perhaps, clothed them in black, because they live in subterraneous places, in the midst of warm sands, or in the vicinity of certain volcanos, or for some other reason, to me unknown, but corresponding to their natural calls. It is thus she has clothed in white the pailencu, or bird of the Tropics, because this bird, which flies at a prodigious elevation above the Sea, passes
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part of it's life in the vicinity of a frozen Atmosphere. These exceptions by no means destroy the general adaptation of those two colours ; on the contrary, they confirm it, seeing it is employed by Nature for diminishing, or increasing, the heat of the animal, in conformity to the temperature of the place where it lives.

I now leave it to Naturalists to explain how it comes to pass, that cold should cause to vegetate the hair of animals in the North ; and why the heat should shorten, or cause to fall off, the hair of animals, to the South ; in contradiction to all the Laws of systematic, nay, of experimental Physics ; for we are assured, from our personal experience, that Winter retards the growth of the human hair and beard, and that Summer accelerates it.

I believe I have a glimpse of a Law very different from the Law of analogies, which we so commonly assign to Nature, because it allies itself to our weakness, by affording us a pretence to explain every thing, with the assistance of a small number of principles. This Law, infinitely varied in it's means, is that of *compensations* *. It is a consequence

* In reflecting on these compensations, which are very numerous, and, among others, on those of the light of the Sun, which embrowns bodies in order to weaken the reflexes of them,

quence from the universal Law, or the mutual adaptation of things, and a sequel of the union of contraries, whereof the harmonies of the Universe are composed. Thus it frequently happens, that effects, so far from being the results of causes, are opposite to them. For example, it has pleased Nature to clothe in white several birds, the inhabitants of warm regions, such as the heron of the

it has suggested itself to my thoughts, that fire must, in like manner, produce matter the best adapted to diminish it's own activity. And of this I have, in fact, made frequent proof, by throwing a little ashes on the flame blazing on my hearth. By this means I have been able to quench it suddenly almost without smoke. I recollect, to this purpose, having, some time ago, seen, in one of our sea-ports, a great caldron full of pitch catch fire, which they were heating for careening a ship. Inexperienced persons immediately attempted to extinguish the flame by throwing water upon it; but the boiling and inflamed matter spread but the more violently, in torrents of fire, over the brim of the caldron; I did not think a single ladle-full would be left within the vessel, when an old seaman run up, and instantly brought it down by throwing upon it a few shovels-full of ashes. I believe, therefore, that by uniting this application with that of water, great assistance might be derived in case of conflagrations; for the ashes would not only deaden the flame, without exciting that dreadful smoke which arises from it, as soon as the engines begin to play, but when once thoroughly moistened, they would retard the evaporation of the water, which is almost instantaneous, when the fire has made a considerable progress. It would afford me inexpressible satisfaction, should this observation merit the attention of those who have ability to give it, from their experience, sagacity, and influence, all the utility of which it is susceptible.

Antilles,

Antilles, and the perroquet of the Moluccas, called *cacatoës*; but she has bestowed, at the same time, on their plumage, a disposition which weakens the reflection of it.

Farther, it is very remarkable, that she has furnished the heads of those birds with tufts and plumes of feathers, which overshadow them, because, as was formerly observed, the head is that part of the body, which, in the animal economy, stands most in need of being kept cool. Such is our crested hen, which comes originally from Numidia. Nay, I do not believe, that there are to be found in any but southern countries, birds with tufted heads. If there are some toward the North, as the lapwing, they make their appearance there only in Summer. Most of those of the North, on the contrary, have the belly and the feet clothed with-tippets formed of down similar to the finest of wool.

This, likewise, is farther worthy of remark, respecting the white birds and quadrupeds of the South, which live in a hot Atmosphere, namely, if I am not mistaken, that the skin of them all is black, which is sufficient to counterbalance the reflection of the colour of their exterior dress. *Robert Knox*, in speaking of certain white quadrupeds of the Island of Ceylon, says, that their skin
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is entirely black. I myself recollect to have seen, at Port l'Orient, a *cacatœs*, whose stomach had been stripped of the feathers, and displayed a skin as black as that of a Negro. When this white bird, with his black beak, and black and naked breast, erected his plume, and clapped his wings, he had the complete air of an Indian King, with his crown, and mantle of feathers.

This Law of compensations employs, therefore, means endlessly varied, which contradict most of the Laws which we have laid in Physics; but this Law must itself be subjected to that of general accommodation or conformity; without which, were we to attempt to render it universal, it would involve us, in it's turn, in the common error. It has given rise, in Geometry, to several axioms extremely doubtful, though of great celebrity, such as the following; *the action is equal to the re-action*; and this other, which is a consequence from it, *the angle of reflection is equal to the angle of incidence*. I shall not stop to demonstrate in how many cases these axioms are erroneous; how many actions in Nature are without re-actions; how many actions have unequal re-actions; how many angles of reflection are deranged by the very planes of incidence. It is sufficient for me, at present, to repeat what I have already, oftener than once, advanced, namely, that the weakness of the human mind,

mind, and the vanity of our education, are incessantly prompting us to generalize. This mode of proceeding is the source of all our errors, and, perhaps, of all our vices. Nature bestows on every being that which is adapted to it, in the most perfect conformity, according to the Latitude for which it is destined; and when the temperature of that Latitude is affected by change of season, she is pleased to vary, likewise, the adaptations. Some of those adaptations are, accordingly, immutable, and others variable.

Nature frequently employs contrary means for producing the same effect. She makes glass with fire; she makes it, too, with water, the crystal for instance: farther, she produces it from animal-organization, such as certain transparent shell-fish. She forms the diamond by a process to us utterly unknown. Conclude now, because a body has been vitrified, it must certainly be by the effect of fire, and rear on this perception the system of the Universe! The utmost that we are capable of doing is to catch some harmonic instants in the existence of beings. That which is vitrifiable becomes calcareous, and what is calcareous changes into glass, by the action of the same fire. Deduce then, from these simple modifications of the fossil kingdom, invariable characters for determining the general classes of it!

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On the other hand, Nature frequently employs, also, the same means, for producing effects directly contrary. For example, we have seen that, in order to increase the heat over the lands of the North, and to mitigate it over those of the South, she made use of opposite colours; she produces in both the same effects, by covering the face of the one and of the other with rocks. These rocks are essentially necessary to vegetation. I have frequently remarked, in those of Finland, stripes of verdure skirting their bases to the South; and in those of the Isle of France, I have seen such verdant stripes on the side averted from the Sun.

The same observations may be made in our own climate. In Summer, when every thing is parched, we frequently find green herbage under walls which have a northerly aspect; it disappears in Winter; but then we find it replaced in front of eminences which face southward.

We have already remarked, that the icy Zones, and the Torrid Zone, contain the greatest quantity of waters, the evaporation of which equally tempers the violence of the heat and of the cold, with this difference, that the greatest lakes are toward the Poles, and the greatest rivers toward the Line. There are, it is admitted, some lakes in the interior of Africa and of America; but they are
placed

placed in elevated atmospheres, in the centre of mountains, where they are not liable to corruption from the action of the heat; but the plains and low grounds are washed by the greatest currents of living water that are in the World, such as the Zara, the Senegal, the Nile, the Mechassippi, the Oroonoko, the Amazon, and others.

Nature proposes to herself, universally, only the accommodation of beings possessed of sensibility. This remark is all-important in the study of her Works; otherwise, from the similitude of the means which she employs, or the exceptions from them, we might be tempted to doubt of the consistency of her Laws, instead of ascribing the majestic obscurity which pervades them, to the multiplicity of her resources, and to the profundity of our own ignorance.

This Law of adaptation and conformity has been the source of all our discoveries. It was this which wafted *Christopher Columbus* to America; because as *Herrera* tells us*, he thought, contrary to the opinion of the Ancients, that the whole five Zones must be inhabited, as GOD had not formed the Earth to be a desert. It is this Law which regulates our ideas respecting objects absolutely be-

* *Herrera's History of the West-Indies. Book I. chap. 2.*

yond the reach of our examination. By means of it, though we are ignorant whether there may be men in the Planets, we are assured there must be eyes, because there is light. It is this which has awakened a sense of Justice in the heart of every man, and informs him that there is another order of things after this life is at an end. This Law, in a word, is the most irresistible proof of the existence of GOD; for amidst such a multitude of adaptations so ingenious, that our passions themselves, restless as they are, never could have devised any thing similar; and so numerous, that every day is presenting to us some that have all the merit of novelty, the first of all, which is the DEITY, must undoubtedly exist, as He is the general conformity of all particular conformities.

It is this, above all, whose existence we endeavour, even involuntarily, every where to trace, and to assure ourselves of it in every possible manner. And this explains to us the reason why the most splendid and comprehensive collections in Natural History, Galleries of the choicest masterpieces in Painting, Gardens filled with the rarest and most curious plants, Libraries stored with the most valuable and best written books; in a word, every thing that presents to us the most marvellous relations of Nature, after having raised us to an extasy of admiration, conclude by superinducing languor

languor and fatigue. We frequently prefer to all these a rustic mountain, a rugged rock, some wild solitude, which might present to us relations newer, and still more direct.

How often, on coming out of the King's magnificent Cabinet of Natural History, do we stop mechanically to look at a gardener digging a hole in the field with his spade, or at a carpenter hewing a piece of timber with his hatchet? It looks as if we expected to see some new harmony start out of the bosom of the Earth, or burst from the side of a lump of oak. We set no value on those which we have just been enjoying, unless they lead us forward to others, which as yet we do not know. But were the complete History given us of the stars of the Firmament, and of the invisible Planets which encircle them, we should perceive in them a multitude of ineffable plans of intelligence and goodness, after which the heart would continue fondly to sigh: its last and only end is the DIVINITY himself.

STUDY ELEVENTH.

APPLICATIONS OF SOME GENERAL LAWS OF NATURE TO PLANTS.

BEFORE I proceed to speak of plants, I must be indulged in making a few reflections on the language of Botany.

We are still so young in the study of Nature, that our languages are deficient in terms to express her most common harmonies. This is so true, that however exact the descriptions of plants may be, and compiled by Botanists of whatever ability, it is impossible to distinguish them in the fields, unless you have previously seen them in Nature, or, at least, in a herbary. Persons who think they have made the greatest proficiency in Botany, need only attempt to draw on paper a plant which they have never seen, after the description of the most accurate Master, to be convinced how widely the copy deviates from the original.

Men of genius have, nevertheless, taken inexpressible pains to assign characteristic names to the different parts of plants. They have even borrowed most of those names from the Greek, a language of singular energy of expression. From this has resulted another inconveniency; it is, that those names, being for the most part compounds, cannot be rendered into modern language; and for this reason it is that a great part of the Works of *Linnaeus* are absolutely incapable of translation. These learned and mysterious expressions, no doubt, diffuse a venerable air over the study of Botany; but Nature has no need of such resources of human art to attract our respect. The sublimity of her Laws can easily dispense with the emphasis and obscurity of our expressions. The more light a man carries in his own bosom, the more wonderful he esteems it to be.

After all, most of those foreign names, employed particularly by the herd of Botanists, do not so much as express the most common characters of vegetables. They frequently make use, for example, of such vague expressions as these, *suavè rubente*, *suavè olente*, of an agreeable red, sweet-smelling, in order to characterize flowers; without expressing the shade of red, or the species of perfume. They are still more embarrassed, when they wish to convey the dusky colours of
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the stem, of the root, or of the fruit : *atro-rubente*, say they, *fusco-nigrescente*, of a dark red, of a dusky brown. As to the forms of vegetables, the case is still worse, though they have fabricated terms compounded of four or five Greek words to describe them.

J. J. Rousseau communicated to me, one day, a set of characters somewhat resembling the algebraic, which he had invented for the purpose of briefly expressing the colours and forms of vegetables. Some of them represented the forms of the flowers ; others, those of the leaves ; others, those of the fruits. Some resembled a heart, some were triangular, some of the lozenge shape. He did not employ above nine or ten of those signs, to compose the expression of one plant. Some he placed above others, with cyphers which indicated the genera and the species of the plant, so that you would have taken them for the terms of an algebraic formula. However ingenious and expeditious this method might be, he informed me that he had given it up, because it presented to him skeletons only.

This sentiment came with peculiar grace from a man whose taste was equal to his genius, and may suggest some reflections to those who are for giving

abridgments of every thing, especially of the Works of Nature. The idea of *John-James*, however, well deserves to be followed up, should it only serve to produce, one day, an alphabet proper to express the language of Nature. All that seems requisite is the introduction of accents, to convey the shades of colours, and all the modifications of flavours, perfumes, and forms. After all, those characters could not be delineated with perfect precision, unless the qualities of each vegetable are first exactly determined by words: otherwise the language of Botanists, which is now accused of speaking only to the ear, would make itself intelligible only to the eye.

This is what I have to propose respecting an object so highly interesting, and which will perfectly coalesce with the general principles which we shall afterwards lay down. The little which I may advance on the subject will serve to supply expression, not only in Botany, and in the study of the other natural Sciences, but in all the Arts, where we find ourselves puzzled every instant, for want of terms to convey the shades and forms of objects.

Though we have only the term *white*, whereby to express the colour which bears that name, Nature

ture presents to us a great variety of sorts of it. Painting, with respect to this article, is as barren as language.

I have been told of a famous Painter of Italy, who, upon a certain occasion, found himself very much embarrassed how to represent, in one of his pieces, three figures dressed in white. The point in question was, to give effect to those figures, to be thus uniformly dressed, and to draw out different shades of the most simple, and the least compounded, of all colours. He was going to abandon his object as a thing impossible, when, happening to pass through a corn-market, he perceived the effect which he was in quest of. It was a group formed by three millers, one of whom was under a tree, the second in the half tint of the shade of that tree, and the third exposed to the rays of the Sun: so that though the drapery of all the three was white, they were completely detached from each other. He introduced a tree, therefore, amidst the three personages of his picture, and, by illuminating one of them with the rays of the Sun, and throwing over the other two different tints of shade, he was enabled to exhibit a drapery of three several casts of white.

This, however, was rather to elude the difficulty, than to resolve it. And this is, in fact, what

Painters do in similar cases. They diversify their whites by shades, half-tints, and reflexes; but these whites are not pure; they are always disturbed with yellow, blue, green, or gray. Nature employs several species of white, without diminishing the purity of it, by dotting, rumpling, radiating, varnishing it, and in various other ways Thus, the whites of the lily, of the daisy, of the lily-of-the-valley, of the narcissus, of the anemone nemorosa, of the hyacinth, are all different from each other. The white of the daisy has something of that of a shepherdess's cornet; that of the hyacinth has a resemblance of ivory; and that of the lily, half transparent and crystalline, resembles the paste of porcelain. I believe, therefore, that all the whites, produced by Nature, or by Art, might be referred to those of the petals of our flowers. We should thus have, in vegetables, a scale of shades of the purest white.

We might, in like manner, procure all the pure and imaginable shades of yellow, of red, and of blue, from the flowers of the jonquil, of the saffron, of the butter-flower of the meadow, of the rose, of the poppy, of the blue bottle of the corn-field, of the larkspur, and so on. We might find, in the same manner, among our common flowers, all the compound shades, such as those of the impurpled violet and foxglove, which are formed of
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the various harmonies of red and blue. The single compound colour, made up of blue and yellow, which constitutes the green of our herbage, is so varied in every plain, that each plant, I may venture to affirm, has it's peculiar shade of that colour. I can have no doubt that Nature has displayed, in equal variety, the other colours of her palette, in the bosom of flowers, or on the surface of fruits.

In performing this, she sometimes employs very different tints, without confounding them ; but she lays them on one above another, so that they form the doves-neck : such is the beautiful shag which garnishes the corolla of the anemone ; in other cases, she glazes their surface, as certain mosses with a green ground, which are glazed over with purple ; she velvets others, such as the pansy ; she powders over some fruits with a delicately fine flour, such as the purple plumb, distinguished by the addition of *de Monsieur* ; or invests them with a light down to soften their vermilion, as the peach ; or smooths their skin, and gives the brightest lustre to their colours, as to the red of the apple of Calleville.

What embarrasses Naturalists the most, in denominating colours, is to find distinctive epithets for such as are dusky ; or rather, this gives them

no manner of concern : for they evade the difficulty by the vague and indecisive expressions, of blackish, gray, ash-coloured, brown, which they convey, it is true, in Greek and Latin words. But those words frequently answer no purpose, except to confound their images, by giving no representation whatever; for what, in good earnest, is meant by these, and such like, epithets, *atro-purpurante*, *fusco-nigrescente*, which they employ so frequently?

It is possible to make thousands of tints widely different from each other, to which such general expressions might be applied. As those dark shades, in truth, are much compounded, it is exceedingly difficult to characterize them by the phraseology of our common vocabularies. But this might be easily and effectually accomplished, by referring them to the different colours of our domestic vegetables. I have remarked in the barks of our trees and shrubbery, in the capsules and shells of their fruits, as well as in the dead leaves, an incredible variety of those sad and gloomy shades, from yellow down to black, with all the intermixtures and accidents of the other colours. Thus, instead of saying in Latin, a yellow inclining to black, or an ash-coloured tint, in order to determine some particular shade of colour in a production of Art, or of Nature, we might say a yellow
low

low of the colour of a dried walnut, or a gray like the bark of a beech-tree.

Those expressions would be so much the more exact, that Nature invariably employs such tints in vegetables, as determining characters and indications of maturity, of vigor, or of decay; and that our peasantry can distinguish the different species of wood in the forests by inspection of their bark simply. Thus, not Botany alone, but all the Arts, might find, in vegetables, an inexhaustible dictionary of unvarying colours, which would not be embarrassed with barbarous and technical compound words, but which would continually present new images. Our books of Science would thence derive much pleasing vivacity, from being embellished by comparisons and expressions borrowed from the loveliest kingdom of Nature.

The great Poets of Antiquity carefully availed themselves of this, by referring most of the events of human life to some appearance of the vegetable kingdom. Thus *Homer* compares the fleeting generations of feeble mortals to the leaves which drop from the trees of the forest, at the end of Autumn; the freshness of beauty to that of the rose; and the paleness which overspreads the countenance of a young man wounded to death in battle, as well as the attitude of his drooping head, to the colour
and

and the fading of a lily, whose root has been torn up by the plough. But we satisfy ourselves with repeating the expressions of men of genius, without daring to tread in their footsteps. This, however, is not the worst, for most Naturalists consider the colours themselves of vegetables as accidents simply. We shall presently see under what a grievous mistake they labour, and how widely they have deviated from the sublime plans of Nature, by persisting in a prosecution of their mechanical and systematic methods.

It is possible, in like manner, to trace an approximation of flavours and smells of every species, and of every country, to those of the plants of our gardens and of our fields. The ranunculus of the meadow has the acridity of the Java-pepper. The root of the caryophyllata, or holy-thistle, and the flower of the pink, smell like the clove of Amboyna. As to compound flavours and smells, they may be referred to such as are simple, the elements of which Nature has scattered over all climates, and which she has united in the class of vegetables. I know a species of morel, used as food by the Indians, which, when boiled, has the taste of beef. They call it *brette*. There is a species of the cranes-bill, the leaf of which resembles, in smell, a roasted leg of mutton. The muscari, a species of small hyacinth, which grows among shrubbery
early

early in the Spring, smells very strongly of the plumb. It's small monopetalous flowers, of a delicate blue colour, and with lips or incisions, have likewise the form of that fruit.

By approximations such as these, the English Navigator *Dampier*, and Father *du Tertre*, have given us, as far as I can judge, the most accurate notions of the fruits and flowers which grow between the Tropics, by referring them to the fruits and flowers of our own climates. *Dampier*, for example, in order to describe the banana, compares it, when stripped of it's thick five-panneled skin, to a large sausage; it's substance and colour to fresh butter in Winter; it's taste, a mixture of apple and of the pear known by the name of the good-christian, which melts in the mouth like marmalade. When this traveller describes some good fruit of the Indies, he sets your mouth a-watering. He possesses a naturally sound understanding, superior, at once, to the methodical trammels of the learned, and to the prejudices of the vulgar. He maintains, for instance, and with truth on his side, in opposition to the opinion of most navigators, that the plantain, or banana, is the king of fruits, without excepting even the cocoa. He informs us, that this is likewise the opinion of the Spaniards, and that multitudes of families live, between the Tropics, on this pleasant, wholesome, and

and nourishing fruit, which lasts all the year round, and stands in no need of any of the arts of cookery.

Father *du Tertre* is not less happy, nor less accurate, in his botanical descriptions. These two travellers give you, at a single stroke, by means of trivial similitudes, a precise idea of a foreign vegetable, which you would search for to no purpose in the Greek names of our first-rate Botanists. This mode of describing Nature, by ordinary images and sensations, is held in contempt by the learned; but I consider it as the only one capable of exhibiting pictures, that have a resemblance, and as the true character of genius. With such assistance, you will be enabled to paint every natural object, and may dispense with methods and systems; without it you will only coin phrases.

Let us now suggest a few thoughts respecting the form of natural objects. It is here that the language of Botany, and even those of the other Arts, are peculiarly barren. Geometry, whose particular object this is, has invented scarcely more than a dozen of regular curves, which are known to only a small number of the learned; and Nature employs an infinite multitude of them in the forms of flowers alone. Some of the uses of these we shall presently indicate. Not that I mean to make of a
study

study prolific of delight, a sublime Science, worthy only of the genius of a *Newton*. As Nature has introduced, in my opinion, not only the colours, the flavours, and the perfumes, but likewise every model of form into the leaves, the flowers, and the fruits of all climates, whether in trees, in herbage, or in mosses; the vegetable forms of other parts of the World, might be referred to those of our own country which are most familiar to us. Such approximations would be much more intelligible than Greek compound words, and would manifest new relations in the different classes of the same kingdom.

They would be no less necessary for expressing the aggregations of the flowers on their stems, of the stems round the root, and the groups of young plants around the parent-plant. It may be affirmed, that the names of most of these vegetable aggregations and dispositions are yet to be invented; the greatest Masters not having been fortunate in characterizing them, or, to speak without reserve, not having made it any part of their study. For example, when *Tournefort* * speaks, in his Voyage to the Levant, of a heliotrope of the Isle of Naxos, which he characterizes thus, *heliotropum humifusum, flore minimo, semine magno*, the creeping heliotrope,

* *Tournefort's Voyage to the Levant*, vol. i.

with a very small flower and a large seed; he says that it has its flowers disposed in form of an ear of corn, going off in a scorpion's tail. There are two mistakes in this description; for the flowers of this heliotrope, similar, from their aggregation, to the flowers of the heliotrope of our climates, and to that of Peru, are not disposed in form of an ear of corn, for they are arranged on a horizontal stem, and only on one side; and they bend downward, like the tail of a snail, and not upward, like the tail of a scorpion.

The same inaccuracy, in respect of image, is to be found in the description which he gives us of the *stachis Cretica latifolia*, the broad-leaved stachis of Crete: its flowers, says he, are disposed in rings. No one can imagine he intends to convey this meaning, that they are disposed like the divisions of the king of the chess-board. Under this form, however, they are represented in the drawing of *Aubriet*, his designer. I do not know any botanic expression which conveys this character of spherical aggregations in separate stories of alternate swellings and sinkings, and terminating in a pyramid. *Barbeau du Bourg*, who possesses much imagination with little exactness, calls this form verticillate, for what reason I know not. If it is from the Latin word *vertex*, head or summit, because these flowers, thus aggregated, form
several

several summits, this denomination would be more applicable to several other plants; and, besides, does not express the swellings, the sinkings, and the progressive diminution of the flowers of the stachis.

Tournefort derives it from the Latin word *verticillus*; that is, says he, a small weight perforated circularly to receive the end of a spindle, in order to make it whirl with greater facility. This is going a great way, in quest of a very imperfect similitude, to an utensil by no means generally known. In saying this, however, I would not be considered as failing in the respect which is due to such a man as *Tournefort*, who first cleared for us the botanic path, and was, besides, a person of profound erudition. But from this carelessness of the great Masters, we may form a judgment of the vague, inaccurate, and incoherent expressions which fill the vocabulary of Botany, and diffuse obscurity over it's descriptions.

After all, I shall be asked, How would you characterize the aggregation of the flowers of the two plants which have just been mentioned? By referring them to aggregations similar to those of the plants of our climates. In this there can be no difficulty: thus, for example, we might refer the assemblage of the flowers of the Grecian heliotrope,

trope, to that of the French, or Peruvian heliotrope: and that of the flowers of the Cretan stachis, to that of the flowers of the horehound, or of the pennyroyal. To this might afterwards be added the differences in colour, smell, flavour, which diversify the species of it. There is no occasion to compound foreign terms to describe forms which are familiar to us. Nay, I defy any one to convey by Greek and Latin words, and with the most learned turn of periphrasis, the simple colour of a bark of a tree. But if you tell me it resembles that of an oak; I have the shade of it at once.

These approximations of plants have this farther utility, that they present us with the combined whole of an unknown object, without which we can form no determinate idea of it. This is one of the defects of Botany, it exhibits the characters of vegetables only in succession; it does not collect them, it decomposes them. It refers them, indeed, to a classical order, but not to an individual order. This, however, is the only one which the weakness of the human mind permits us to catch. We love order, because we are feeble, and because the least confusion disturbs us; now, there is no order which we can adopt more easily than that which approaches to an order which is familiar to us, and which Nature is every where presenting.

senting. Try to describe a man feature by feature, limb by limb; be ever so exact, yet you never will be able to give me his portrait: but if you refer him to some known personage; if you tell me, for example, that he is of the make and mien of a Don Quixote; or with a nose like that of St. *Charles Baromeo*, and so on, and you paint me his picture in four words. It is to the whole of an object that the ignorant, an epithet which includes the greatest part of Mankind, attach themselves in the first instance, in order to acquire the knowledge of it.

It would, therefore, be of essential importance to have, in Botany, an alphabet of colours, flavours, smells, forms, and aggregations, derived from our most common plants. Those elementary characters would enable us to express ourselves exactly in all the parts of Natural History, and to present to ourselves relations equally new and curious.

In hope that persons of superior intelligence may hereafter be induced to take up the subject, I proceed to the discussion of it with what ability I have, notwithstanding the embarrassment of language.

When we see a multitude of plants, of different forms, vegetate on the same soil, there is a disposition to believe, that those of the same climate

grow indifferently every where. But those only which are produced in places particularly assigned to them by Nature, attain there all the perfection of which they are susceptible. The same thing holds good with respect to animals. Goats are sometimes reared in marshy places, and ducks on the mountains; but the goat never will acquire, in Holland, the beauty of that which Nature clothes with silk on the rocks of Angora; nor will the duck of Angora ever attain the stature and the colours of those which are to be found in the canals of Holland.

If we throw a simple glance on plants, we shall perceive that they have relations to the elements which promote their growth; that they have relations to each other, from the groups which they contribute to form; that they have relations to the animals which derive nourishment from them; and, finally, to Man, who is the centre of all the Works of Creation. To these relations I give the name of harmonies, and I divide them into elementary, into vegetable, into animal, and into human.

By proposing this division, I shall reduce to something like order the disquisition on which I am going to enter. It cannot be supposed that I should examine them in detail: those of a single species

species would furnish speculations, which the application of a whole life could not exhaust; but I shall unfold enough of their general harmonies to produce conviction, that an infinite Intelligence reigns in this amiable part of Creation, as in the rest of the Universe.

We shall thus make application of the Laws which we have previously established, and shall take a glimpse of a multitude of others, equally worthy of research, and equally calculated to excite admiration. Reader, be not astonished at either their number, or their extent. Let this great truth be deeply impressed on thy heart: *GOD has made nothing in vain!* A scholar, with his systems and methods, finds himself stopped short in Nature every step he takes; while furnished with this as a key, the ignorant rustic is able to unlock every door of knowledge.

ELEMENTARY HARMONIES OF PLANTS.

Plants have as many principal parts as there are elements with which they keep up a relation. By their flowers, they stand related to the Sun, which fecundates their seeds, and carries them on to maturity; by their leaves, they are related to the waters, which bedew them; by their stems, to the winds

winds which agitate them ; by their roots, with the ground which sustains them ; and by their grains, with their situations adapted to their growth and increase. Not that these principal parts have no indirect relations besides to the other elements, but it will be sufficient for our purpose to dwell on such as are immediate.

*Elementary Harmonies of Plants with the Sun, by the
Flowers.*

Though Botanists may have made great and laborious researches respecting plants, they have paid no attention to any of those relations. Fettered by their systems, they have attached themselves to the consideration of them, particularly on the side of the flowers : and have arranged them in the same class, wherever they found these external resemblances, without so much as enquiring what might be the particular use of the florification. They have, indeed, distinguished in it the stamina, the antheræ, and the stigmata, for the fecundation of the fruit, but, excepting this, and some others, which respect the interior organization, they have neglected, or misunderstood, the relations which the whole plant has with the rest of Nature.

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This partial division has led them into the strangest confusion ; for, by considering the flowers as the principal characters of vegetation, and by comprehending in the same class those which were similar, they have united plants entirely foreign to each other, and have separated, on the contrary, many which are evidently of the same genus. Such is, in the first case, the fullers-thistle, called *dipsacus*, which they class with the scabious, because of the resemblance of some parts of it's flower ; though it presents in it's branches, it's leaves, it's smell, it's seed, it's prickles, and the rest of it's qualities, a real thistle : and such is, in the second, the great chestnut of India, which they exclude from the class of chestnut-trees, because it has different flowers. To class plants from the flowers, that is, from the parts of their fecundation, is the same thing with classing animals from those of generation.

However, though they have referred the character of a plant to it's flower, they misunderstand the use of it's most shining part, which is that of the corolla. They call that the corolla, which is, in common language, denominated the leaves of a flower. It is a Latin word, signifying a little crown, from the disposition of the leaves, in many species, in the form of coronets, and they have given the name of petals to the divisions of that

crown. Some, in truth, have acknowledged it to be properly adapted for covering the parts of fecundation before the expansion of the flower; but it's calix is much better adapted to this purpose, from it's thickness, from it's beards, and sometimes from the prickles with which it is invested. Besides, when the corolla leaves the stamina exposed, and when it continues fully blown for whole weeks, it must of necessity be answering some other purpose; for Nature does nothing in vain.

The corolla seems intended to reverberate the rays of the Sun on the parts of fecundation; and we shall be put beyond the reach of doubt as to this, if we consider the colour and the form of it in most flowers. It has been remarked in the preceding Study, that of all colours, white is the most proper for reflecting the heat: now, it is, in general, that which Nature bestows on the flowers that blow at cold seasons and in cold places, as we see is the case in the snow-drop, the lily of the valley, the hyacinth, the narcissus, and the anemone-nemerosa, which come into flower early in the Spring. We must likewise assign to this colour such as have slight shades of the rose and of the azure, as many hyacinths; as well as those which have yellow and shining tints, as the flowers of the dandelion, the butter-flower of the meadow,
and

and the wall gilly-flower. But such as blow at warm seasons, and in warm situations, as the cockle, the wild poppy, and the blue-bottle, which grow in Summer amongst the corn, are dressed in strong colours, such as purple, deep red, and blue; for these absorb the heat without greatly reflecting it.

I do not know, however, that there are any flowers entirely black; for in that case, it's petals, destitute of all power of reflection, would be entirely useless. In general, of whatever colour a flower may be, the under part of it's corolla, which reflects the rays of the Sun, is of a much paler tint than the rest. This is so very remarkable, that Botanists, who generally consider the colours of flowers as accidents merely, distinguish it by the name of *unguiculus* (a little nail). The unguicle is that with relation to the flower which the belly is with relation to animals: it's shade is always clearer than that of the rest of the petal.

The forms of flowers are no less adapted than their colours to reflect the heat. Their corollæ, divided into petals, are only an assemblage of mirrors directed toward one focus. Of these they have sometimes four, which are plain, as the flower of the cole-wort in the cruciform; or a complete circle, as the daisy in the class of radiated; or

spherical portions, as the rose; or entire spheres, as the bells of the lily of the valley; or cones mutilated, as the foxglove, the corolla of which is formed like a sewing thimble.

Nature has placed, at the focuses of these, plain, spherical, elliptical, parabolic, and other mirrors, the parts of the fecundation of plants, as she has placed those of generation in animals, in the warmest parts of their bodies. These curves, which Geometricians have not yet examined, merit their most profound researches. Is it not astonishing, that they should have bestowed such learned pains to find out curves altogether imaginary, and frequently useless; and that they should have neglected to study those which Nature employs so regularly, and in such variety, in an infinite number of objects? Be this as it may, Botanists have given themselves still less trouble about the matter. They comprehend those of flowers under a small number of classes, without paying the slightest attention to their use, nay, without so much as apprehending that they could have any. They confine themselves entirely to the division of their petals, which frequently change nothing of the configuration of their curves; and they frequently class under the same name those which are the most opposite. Thus, under the general designation

tion of the *monopetalous*, (those that have a single petal) they include the spheroid of the lily of the valley, and the trumpet of the convolvulus.

On this subject, a very remarkable circumstance claims our notice; namely, that, frequently, such as is the curve formed by the border, or upper extremity of the petal, such too is the plan of the whole petal itself; so that Nature presents to us the cut or shape of each flower in the contour of it's petals, and gives us, at once, it's plan and it's elevation. Thus roses, and the whole tribe bearing this denomination, have the border of their petals in sections of a circle, like the curve of the flowers themselves; the pink and blue-bottle, which have their selvage notched, present the plans of their flowers plaited up like fans, and form a multitude of focuses.

For want of the real flower, these curious remarks may be verified from the drawings of Painters who have been the most exact in copying plants, but who are indeed very few in number. Such is, among those few, *Aubriet*, who has drawn the plants of *Tournefort's* voyage to the Levant*, with the taste of a Painter, and the precision of a Botanist. You may there see the confirmation of

* *Tournefort's* Voyage to the Levant, vol. i.

what I have just been advancing. For example, the *scorzonera Græca saxatilis* & *maritima foliis variè laciniatis*, (the Greek saxatile and marine scorzonera, with leaves variously scolloped) which is there represented, has it's petals, or half-flowers, squared at the extremity, and plane in their surface. The flower of the *stachis Cretica latifolia*, (the broad-leaved stachis of Crete) which is a monopetalous tubular plant, has the upper part of it's corolla undulated, as well as it's tube. The *campanula Græca saxatilis jacobææ foliis*, (the Greek bell-flower of the rocks, with ragwort leaves) presents these consonances in a manner still more striking. This campanula, which *Tournefort* considers as the most beautiful he had ever seen, and which he sowed in the Royal Garden at Paris, where it succeeded very well, is of the pentagonal form. Each of it's faces is formed of two portions of a circle, the focuses of which, undoubtedly, meet on the same anthera; and the border of this campanula is notched into five parts, each of which is likewise cut into the form of a Gothic arch, as each subdivision of the flower is. Thus, in order to know, at once, the curve of a flower, it is sufficient to examine the brim of it's petal.

It is of much utility to attend to this observation, for otherwise it would be extremely difficult to determine the focuses of the petals. Besides,
flowers

flowers lose their internal curves in herbaries. I believe these consonancies to be general; I presume not, however, to assert, that they admit of no exceptions. Nature may deviate from this order, in some species, for reasons which I know not. It cannot be too frequently repeated; She has no general and unvarying Law, except the accommodation of beings endowed with sensibility. The relations just now suggested, between the curve of the brim and that of the petal, seem, beside, to be founded on this universal Law, as they present conformities of such agreeable approximation.

The petals appear to such a degree destined to warm the parts of fecundation, that Nature has placed a circle of them around most compound flowers, which are themselves aggregations of small tubes, infinite in number, that form so many particular flowers, or, if you will, flowrets. This is obviously remarkable in the petals which surround the disks of daisies and sun-flowers. They are likewise to be met with around most of the umbelliferous plants: though each flowret which composes them, has it's particular petals, there is a circle of others still greater, which encompasses their assemblage, as you may see in the flowers of the daucus.

Nature

Nature has still other means of multiplying the reflexes of heat in flowers. Sometimes she places them on stems of no great elevation, in order to collect warmth from the reflections of the Earth; sometimes she glazes over their corollæ with a shining varnish, as the yellow meadow-ranunculus, known by the trivial name of butter-flower. Sometimes she withdraws the corolla, and makes the parts of fecundation to shoot from the partition of an ear, of a cone, or of the branch of a tree. The forms of the spike, and of the cone, appear to be the best adapted for reverberating on them the action of the Sun, and to ensure their fructification; for they always present some one side or another sheltered from the cold. Nay, it is very remarkable, that the aggregation of flowers, in a conical and spike form, is very common to herbs and to trees of the North, and rarely to be found in those of the South. Most of the gramineous plants which I have seen in southern Countries, do not carry their grains in a spike, or closely compacted ear, but in flowing tufts, and divided into a multitude of particular stems, as the millet and rice. The maize, or Turkey-corn, I admit, bears it's grains in a large ear; but that ear is for a considerable time shut up in a bag; and on bursting from it, pushes away over it's head a long covering of hair, which seems entirely destined to the purpose

pose of sheltering it's flowers from the heat of the Sun.

Finally, what confirms me in the belief, that the flowers of plants are adapted to the action of heat, conformably to the nature of every climate, is this, that many of our European plants vegetate extremely well in the Antilles-Islands, but never come to seed there. Father *du Tertre* observed, that in those islands *, the cabbage, the fainfoin, the lucern, the savory, the sweet basil, the nettle, the plaintain, the wormwood, the sage, the liverwort, the amaranth, and all our species of gramineous plants, throve there wonderfully well, but never produced grains. These observations demonstrate, that it is neither the air, nor the soil, which is inimical to them ; but the Sun, which acts with too much vivacity on their flowers, for most of these plants have theirs aggregated into an ear, which greatly increases the repercussion of the solar rays.

I believe, at the same time, that such plants might be naturalized in the West-India Islands, as well as many others of our temperate climates, by selecting from the varieties of their species, those whose flowers have the smallest fields, and

* Natural History of the Antilles, by Father *du Tertre*.

whose

whose colours are the deepest, or those whose panicles are divergent.

Not that Nature has no other resources except such as these, to make plants of the same genus attain perfection in different seasons and climates. She can render their flowers capable of reflecting the heat, in different degrees of Latitude, without any very sensible alteration of the form. Sometimes she mounts them on elevated stems, to remove them from the influence of the reflection of the ground. It is thus she has placed, between the Tropics, most of the apparent flowers upon trees. I have seen but few there in the meadows, but a great many in the forests. In those countries, you must look aloft, in order to have a sight of flowers; in our native climes, we must cast our eyes on the ground, for this purpose; for with us flowers grow on herbage and shrubbery. Sometimes she expands them under the shade of leaves; such are those of the palm-tree, of the banana, and of the *jacquier*, which grow close to the trunk of the tree. Such, likewise, are, in our temperate climates, those large white bell-formed flowers, known by the name of Lady's-smock, which delight in the shade of the willow.

There are others, such as most part of the convolvuluses, which expand only in the night; others
grow

grow close to the ground, and exposed, as the pansy, but their drapery is dusky and velvety. There are some which receive the action of the Sun when at a considerable height, as the tulip; but Nature has taken her precautions so exactly, as to bring out this stately flower only in the Spring, to paint it's petals with strong colours, and to daub the bottom of it's cup with black*.

* This flower, from it's colour, is, in Persia, the emblem of perfect lovers. *Chardin* tells us, that, when a young Persian presents a tulip to his mistress, it is his intention to convey to her this idea, that, like this flower, he has a countenance all on fire, and a heart reduced to a coal. There is no one Work of Nature, but what awakens in man some moral affection. The habits of society insensibly efface, at length, the sentiment of it; but we always find it in vigor among Nations who still live near to Nature.

Many alphabets have been imagined in China, in the earlier ages, after the wings of birds, fishes, shells, and flowers: of these, very curious characters may be seen in the China illustrated of *Father Kercher*. It is from the influence of those natural manners, that the Orientals employ so many similitudes and comparisons in their languages. Though our metaphysical eloquence makes no great use of them, they frequently produce, nevertheless, a very striking effect. *J. J. Rousseau* has taken notice of that which the Ambassador of the Scythians proposed to *Darius*. Without speaking a word, he presented him with a bird, a frog, a mouse, and five arrows†. *Herodotus* relates, that the

† *Darius*, at first, understood this as a complete surrender of Scythian independance into his hands; but the event instructed him, that this high-spirited people intended to convey a bold defiance: "Unle's you can fly as a bird, dig as a mouse, swim as a frog, our arrows shall reach you."
H. H.

same

Others are disposed in girandoles, and receive the effect of the solar rays only under one point of the compass. Such is the girandole of the lilach, which, pointing with various aspects, to the East, to the South, to the West, and to the North, presents, on the same cluster, flowers in bud, half open, fully blown, fading, and all the delightful shades of the florification.

There are flowers, such as the compound, which being in a horizontal position, and completely exposed, behold the Sun, like the Horizon itself, from his rising to his setting; of this description is the flower of the dandelion. But it possesses very peculiar means of sheltering itself from the heat: it closes entirely whenever the heat becomes excessive. It has been observed to open, in Summer, at half an hour after five in the morning, and to collect its petals toward the centre, about nine o'clock. The flower of the garden-lettuce,

same *Darius* sent word to the Greeks of Ionia, who were laying waste the country, that if they did not give over their depredations, he would treat them like pines. The Greeks, who by this time had become infected with wit, and had proportionally begun to lose sight of Nature, did not comprehend the meaning of this. Upon enquiry, they at length discovered that *Darius* meant they should understand it to be his resolution utterly to exterminate them; for the pine-tree, once cut down, shoots out again no more.

which

which is, on the contrary, in a vertical plane, opens at seven o'clock, and shuts at ten.

From a series of similar observations it was, that the celebrated *Linnaeus* had formed a botanical time-piece; for he had found plants which opened their flowers at every hour of the day, and of the night. There is cultivated in the King's Garden, at Paris, a species of serpentine aloes, without prickles, whose large and beautiful flower exhales a strong odour of the vanilla, during the time of it's expansion, which is very short. It does not blow till toward the month of July, and about five o'clock in the evening: You then perceive it gradually open it's petals, expand them, fade, and die. By ten o'clock of the same night, it is totally withered, to the great astonishment of the spectators, who flock in crowds to the sight; for what is uncommon is alone admired. The flower of our common thorn, I do not mean that of the white-thorn, is still more extraordinary; for it flowers so rapidly, that there is scarce time to observe it's expansion.

These observations, taken in their connection, clearly demonstrate the relations of the corollæ to the heat of the Sun. To all those which have gone before, I shall subjoin one more, by way of conclusion, which evidently proves the use for

which they are intended ; it is this, The duration of their existence is regulated by the quantity of heat which it is their destination to collect. The hotter it is, the shorter is their duration. They almost all drop off as soon as the plant is fecundated.

But if Nature withdraws the greatest number of flowers from the too violent action of the Sun, she destines others to appear in all the lustre of his rays, without sustaining the least injury from them. On the first she bestows dusky reflectors, or such as can close themselves as occasion requires; she provides others with parasols. Such is the crown-imperial, whose flowers, like a bell inverted, grow under the shade of a tuft of leaves. The chrysanthemum-peruvianum, or to employ a better-known term, the turnsol, which turns continually toward the Sun, covers itself, like Peru, the country from which it comes, with dewy clouds, which cool and refresh it's flowers, during the most violent heat of the day. The white flower of the lychnis, which blows in our fields, in Summer, and presents, at a distance, the resemblance of a Maltese-cross, has a species of contraction, or narrow collar, placed at it's centre, so that it's large shining petals turned back outwardly, do not act upon it's flamina. The white narcissus has, in like manner, a small tunnel. But Nature stands in no need to
create

create new parts, in order to communicate new characters to her Works. She deduces them, at once, from existence and from non-existence ; and renders them positive, or negative, at her pleasure. She has given curves to most flowers, for the purpose of collecting the heat at their centre : she employs the same curves, when she thinks proper, in order to dissipate the heat : she places the focuses of them so as to act outwardly. It is thus that the petals of the lily are disposed, which are so many sections of the parabola. Notwithstanding the large size and the whiteness of it's cup, the more it expands, the more it disperses the fervent heat of the Sun ; and while, in the middle of Summer, at noon-day, all other flowers, parched by his burning rays, droop and bend their heads to the ground, the lily rears his head like a king, and contemplates, face to face, the dazzling orb, which is travelling majestically through the Heavens.

I proceed to display, in a few words, the positive, or negative, relations of flowers, with respect to the Sun, to the five elementary forms which I have laid down, in the preceding Study, as the principles of the harmony of bodies. This is not so much a plan which I take upon me to prescribe to Botanists, as an invitation to engage in a ca-

teer so rich in observations, and to correct my errors by communicating some portion of their knowledge.

There are, therefore, reverberating flowers *perpendicular, conical, spherical, elliptical, parabolic, or plane*. To these curves may be referred most of the curves of flowers. There are, likewise, some flowers in form of a parasol, but the others are much more numerous; for the negative effects, in every harmony, are in much greater number than the positive effects. For example, there is but one single way of coming into life, and there are thousands of going out of it. We shall oppose, however, to every positive relation of flowers to the Sun, a principal negative relation, that we may be enabled to compare their effects in every Latitude.

PERPENDICULAR reverberating flowers are those which grow adhering by the back to a cone, to long catkins, or to an ear: such are those of the cedar, of the larch, of the fir, of the birch, of the juniper; of most of the northern gramineous plants, of the vegetables of cold and lofty mountains, as the cypress and the pine; or of those which flower in our climates about the end of Winter, as the hazel and the willow. A part of
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REVERBERATING

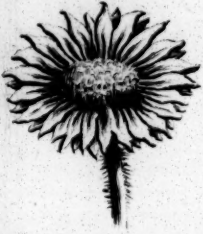
5. In horizontal
Plans.

6. Or Parabolic.

4. Elliptic.

3. Spheric.

5. The Daisy.



6. The Nun
of Peru.



11. The Blue Bottle.

4. The Tulip.



10. The Imperial.

3. The Simple Rose.



9. Pea Blossom.

11. In unequal Plans.

10. In the Ellipse inverted.

9. In the Sphere folded

PARASOL FLOW

RATING FLOWERS.

ic.

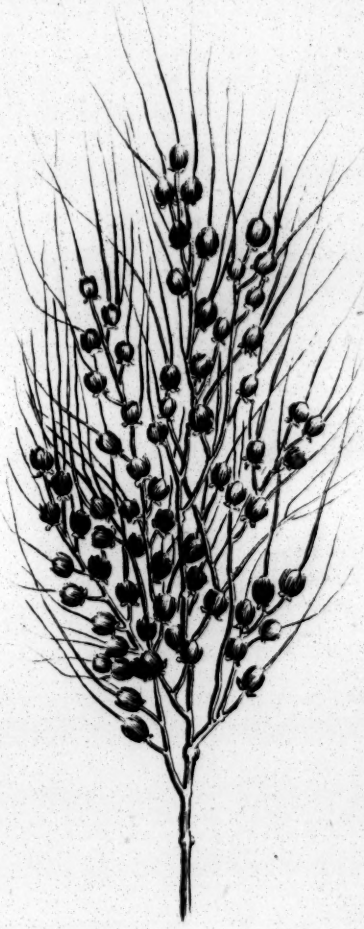
2. Conic.

1. Perpendicular.

Simple Rose.

2. Convolvulus of the Day.

1. Ear of Corn



Blossom.

8 Convolvulus of the Night.

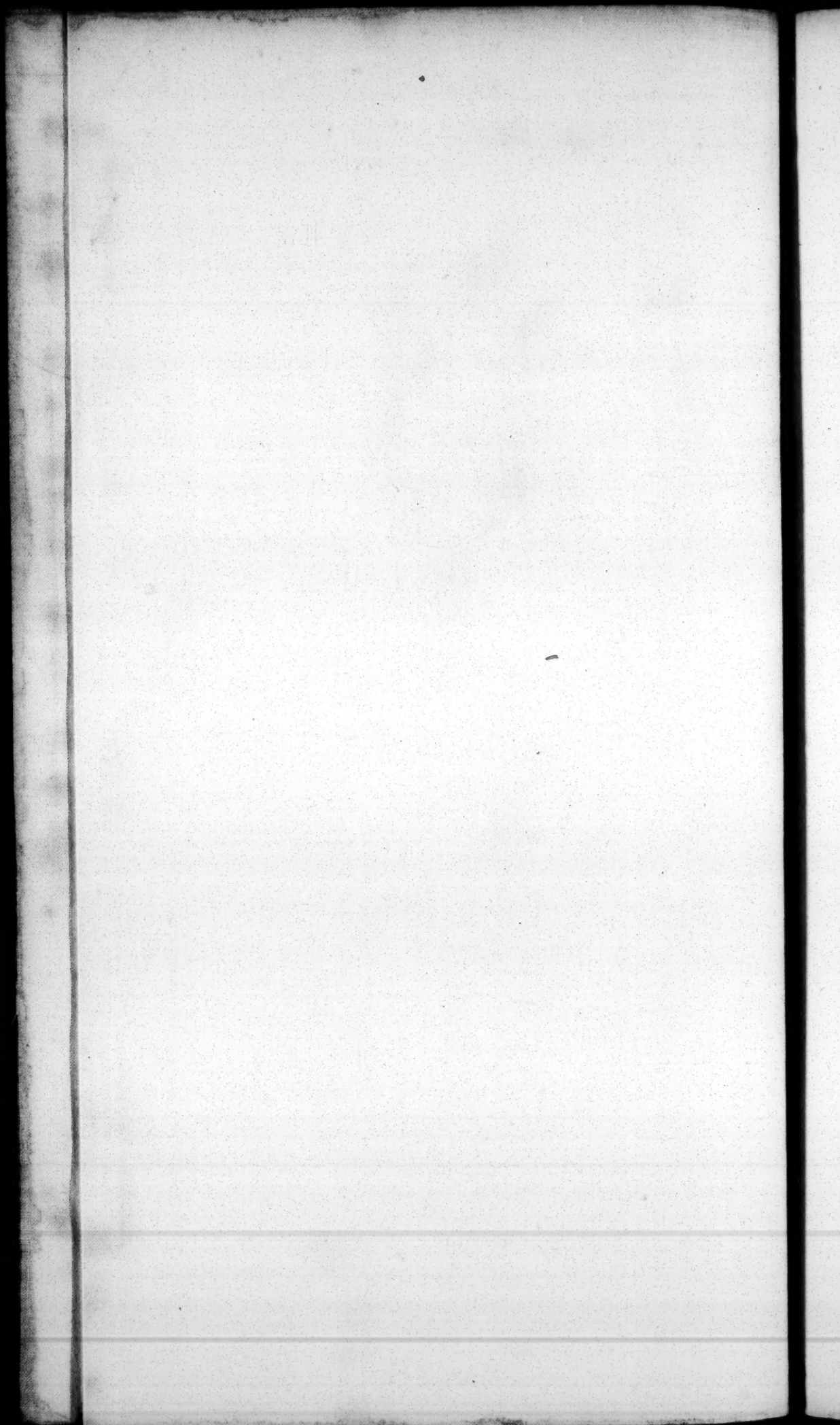
7. Ear of Rice.

where folded inwards.

8. In a Cone closed.

7. Divergent.

L FLOWERS.



the flowers in this position is sheltered from the North wind, and receives the reflection of the Sun from the South side.

It is remarkable that all vegetables which bear cones, catkins, or spikes, present them at the extremity of their stems, exposed to all the action of the Sun. It is not so with those which grow within the Tropics; most of which, such as the palm-tree, bear divergent flowers, attached to pendent clusters, and shaded by their branches. The greatest part of the gramineous plants of warm countries, have likewise divergent ears; such are the millets of Africa. The solid ear of the American maize is crowned with a hairy tuft which shelters its flowers from the Sun. On the annexed plate are represented an ear of European corn, and an ear of the rice of southern Asia, to furnish the means of comparison.

CONICAL reverberating flowers reflect on the parts of florification a complete cone of light. Its action is very powerful; and it is, accordingly, very remarkable, that Nature has given this configuration of petal only to flowers which grow under the shade of trees, as to the convolvulus, which scrambles up around their trunk; and that she has assigned to this flower a very transient duration, for it scarcely lasts half a day; and when its fecundation

cundation is completed, the border contracts inwardly, and gathers together like a purse. Nature has, however, given it a place in southern latitudes, but she has there tinged it with violet and blue, in order to weaken the effect. Besides, this flower scarcely ever opens in hot countries, except in the night. From this nocturnal character, I presume, it is, that we are chiefly enabled to distinguish the convolvulus of the South, from that of our own climates, which blows in the day-time. In the plate we have represented the day-convolvulus, or that which is native with us, expanded; and that of the night, or of hot countries, closed; the one having a positive character with the light, and the other a negative character.

The flowers which partake the most of this conical form are those which grow early in the Spring, as the flower of the arum, which is formed like a cornet; or those which thrive on lofty mountains, as the bears-ear of the Alps. When Nature employs it in Summer, it is almost always with negative characters, as in the flowers of the fox-glove, which are inclined, and dyed a deep red, or blue colour.

SPHERICAL reverberating flowers, are those whose petals are formed into segments of a circle. One might amuse himself very agreeably, in observing that

that these spherically formed petals have, at their focuses, the antheræ of the flower supported on fibrets, longer or shorter, as the effect intended may require. It deserves farther to be remarked, that each petal is adapted to it's particular anthera, sometimes to two, or even to three: so that the number of petals in a flower divides, almost always, exactly that of the antheræ. As to the petals, they scarcely ever exceed the number of five, in rose-formed flowers, as if Nature had designed to express, in that, the number of the five terms of elementary progression, of which this beautiful form is the harmonic expression.

Spherical reverberating flowers are very common in our temperate climates. They do not throw back the whole reflection of their disks on the antheræ, like the convolvulus, but only the fifth part, because each of their petals has it's particular focus. The rose-formed flower is spread over most fruit-trees, as the apple, the pear, the peach, the plumb, the apricot, and the like; and over a great part of our shrubbery and herbage, such as the black and white-thorn, the bramble, the anemone, and many others, most of which produce for Man a nutritious fruit, and which flower in the month of May. To this form may be likewise referred such as are spheroidal; the lily of the valley, for example.

This form, which is the harmonic expression of the five elementary forms, was admirably adapted to a temperature like ours, which is itself the proportional medium between that of the Icy and of the Torrid Zone. As spherical reflectors collect a great quantity of rays at their focuses, their action is very powerful, but, at the same time, of very transient duration. It is well known that nothing fades more quickly than a rose.

Rose-formed flowers are very rare between the Tropics, especially those whose petals are white. They thrive only under the shade of trees. I have known many of the inhabitants of the Isle of France make fruitless efforts to raise strawberries there; but one of them, who lived, indeed, in an elevated part of the Island, found means of procuring them in great plenty, by planting his beds under trees, in ground but half-cleared.

As a compensation for this, Nature has multiplied, in warm countries, papilionaceous, or leguminous flowers. The leguminous flower is entirely opposite to the rose-formed. It usually has five rounded petals, like the other: but instead of being disposed round the centre of the flower, in order to reverberate thither the rays of the Sun, they are, on the contrary, folded inward, around the antheræ, for the purpose of sheltering them. You distinguish

distinguish in them, a pavilion, two wings, and a ridge, usually divided into two, by which the antheræ and the embryo of the fruit are closely covered over. Between the Tropics, accordingly, a great number of trees, shrubs, creepers, and grasses, have papilionaceous flowers. Every species of our pease and french-beans, succeed there wonderfully well, and those countries produce infinite varieties of them. Nay, it is remarkable, that even at home, those plants delight in a sandy and warm soil, and exhibit their flowers in the middle of Summer. I consider leguminous flowers, therefore, as of the parasol kind. To those same negative effects of the Sun may, likewise, be referred the form of flowers with gullets, which conceal their antheræ, such as the calfs-snout, which takes pleasure in blowing on the sides of walls.

ELLIPTICAL reverberating flowers are those which present oval-formed cups, narrower a-top than in the middle. It is very perceptible that this form of cup, the perpendicular petals of which approach toward each other at the summit, shelters, in part, the bottom of the flower: and that the curves of these same petals, which have several focuses, do not collect the rays of the Sun toward one single centre: such is the tulip. It is remarkable, that this oblong-formed flower is more
common

common in warm countries than the rose-formed. The tulip grows spontaneously in the vicinity of Constantinople. To this form may likewise be referred that of the liliaceous, which are more common there than elsewhere. However, when Nature employs them in countries still farther to the South, or in the middle of Summer, it is almost always with negative characters; thus, she has inverted the tulip-form flowers of the imperial, which is originally from Persia, and has shaded them with a tuft of foliage. Thus, she bends back outwardly, in our climates, the petals of the lily; but the species of white lilies which grow between the tropics, have, besides, their petals cut out into thongs.

Flowers with PARABOLIC, or PLANE, mirrors, are those which reflect the rays of the Sun in parallel directions. The configuration of the first gives much lustre to the corolla of these flowers, which emit from their bosom, if I may be allowed the expression, a bundle of light, for they collect it toward the bottom of their corolla, and not on the antheræ. It is, perhaps, in order to weaken the action of it, that Nature has terminated flowers of this form in a species of cowl, which Botanists call spur. It is probably in this tube that the focus of their parabola terminates, which is, perhaps, situated there, as in many curves of this kind,
beyond

beyond it's summit. Flowers of this sort are frequent between the Tropics; such is the flower of the *poincillade* of the Antilles, otherwise called the peacock-flower, on account of it's beauty; such is also the *nasturtium*, or nun of Peru. It is even pretended that the perennial species is phosphoric in the night-time.

Flowers with plane mirrors produce the same effects; and Nature has multiplied the models of them in our Summer flowers, and in those which thrive in warm and sandy soils, as the radiated; such are the flowers of the dandelion. We likewise meet with them in the flowers of the *doronicum*, of the lettuce, of the succory; in the asters, in the meadow daisy, and others. But she has placed the original model of them under the Line, in America, in the broad Sun-flower, which we have borrowed from Brasil.

These being flowers whose petals have the least activity, are likewise those which are of the longest duration. Their attitudes are varied without end. Such as are horizontal, like those of the dandelion, close, it is said, toward the middle of the day; they are, likewise, such as are the most exposed to the action of the Sun, for they receive his rays from his rising to his setting.

There

There are others which, instead of closing their petals, invert them, which produces nearly the same effect; such is the flower of the camomile. Others are perpendicular to the Horizon, as the flower of Lettuce. The blue colour, with which it is tinged, contributes, farther, towards weakening the rays of the Sun, which, in this aspect, would act too vehemently upon it. Others have only four horizontal petals; such as the cruci-form; the species of which are very common in hot countries. Others bear, around their disk, flowrets which overshadow it; such is the blue-bottle of the corn-field, which is represented on the plate in opposition to the daisy. This last flowers early in the Spring, and the other in the middle of Summer.

We have said somewhat of the general forms of flowers, but we should never come to a conclusion, were we to enter into a discussion of their various aggregations. I believe, however, that they may be referred to the plan itself of the flowers. Thus the umbelliferous flowers present themselves to the Sun under the same aspects as the radiated.

I must beg leave to recapitulate only what has been said respecting their reflecting mirrors. The
reverberated

reverberated perpendicular, of a cone or ear form, collects on the antheræ of the flowers, an arch of light of ninety degrees, from the Zenith to the Horizon. It farther presents, in the inequality of it's panels, reflecting surfaces.

The conical reflector collects a cone of light of sixty degrees. The spherical reflector unites, in each of it's five petals, an arch of light of thirty-six degrees of the Sun's course, supposing that Luminary to be in the Equator.

The elliptical reflector collects a smaller quantity, from the perpendicular position of it's petals ; and the parabolic reflector, as well as that with plane mirrors, sends back the rays of the Sun divergently, or in parallels.

The first form appears to be very common in the flowers of the icy Zones ; the second, in those which thrive under the shade ; the third, in temperate latitudes ; the fourth, in warm countries ; and the fifth, in the Torrid Zone. It would likewise appear, that Nature multiplies the divisions of their petals, in order to diminish their action. Cones and ears have no petals. The convolvulus has but one ; rose-formed flowers have five ; elliptical flowers, as the tulip and the liliaceous, have six ;

fix; flowers with plane reflectors, as the radiated, have a great number.

Farther, flowers have parts adapted to the other elements. Some are clothed externally with a hairy garment, to shelter them from the cold. Others are formed to blow on the surface of the water; such are the yellow roses of the nymphæa, which float on lakes, and accommodate themselves to the various movements of the waves, without being wet by them, by means of the long and pliant stems to which they are attached. Those of the *valisneria* are still more artfully disposed. They grow in the Rhone, and would be there exposed to frequent inundation by the sudden swellings of that river, had not Nature given them stems formed like a cork-screw, which draw out at once to the length of three or four feet.

There are other flowers adapted to the winds and to the rains, as those of pease, which are furnished with little boats to cover and shelter the stamina, and the embryos of their fruits*. Besides,

* I am persuaded, that the bearing of most flowers is adapted to the rains, and for this reason it is that many of them have the form of mufflers, or ridges, like little boats inverted, which shelter the parts of fecundation. I have remarked that many species

sides, they have large pavilions, and rest on tails bent and elastic, as a nerve; so that when the wind blows over a field of pease, you may see all the flowers turn their back to the wind, like so many weather-cocks.

This class appears to be very generally diffused over places much exposed to the winds. *Dampier* relates, that he found the desert shores of New-Guinea covered with pease, whose blossoms were red and blue. In our climates, the fern, which crowns the summits of hills always battered with the wind and the rain, bears it's flower turned toward the Earth, on the back of it's leaves. There are even certain species of plants, the flowering of which is regulated by the irregularity of the winds. Such are those, the male and female individuals of which grow on separate stems. Tossed hither and thither over the earth, frequently at great distances from each other, the powder of the male flowers could fecundate but a very few fe-

species of flowers possess the instinct, shall I venture to call it? of closing themselves when the air is humid, and that the impregnation of fruit-tree blossoms is injured much more by the rain than by the frost. This observation is of essential importance to gardeners, who frequently cause the flowers of their strawberry plants to miscarry by watering them. As far as I can judge, it would be better to water plants, in blossom, by little trenches, according to the Indian method, rather than by asperision.

male

male flowers, unless, at the season of their florification, the wind blew from various quarters. Wonderful to be told! There are invariable generations depending on the variableness of the wind. Hence I presume, that in countries where the winds always blow from the same quarter, as between the Tropics, this species of florification must be uncommon; and if it be found there at all, it must be regulated precisely according to the season when those regular winds vary.

It is impossible to entertain a doubt respecting those admirable relations, however remote they may appear, when we observe the attention with which Nature has preserved flowers from the shocks to which they might be exposed, from the winds themselves, upon their stems. She inwraps them, for the most part, in an integument, which Botanists call the *calix*. The more ramous the plant is, the thicker is the calix of it's flower. She sometimes fringes it with little cushions and beards, as may be seen in the rose-bud. Thus the mother puts a pad round the head of her little child, to secure it against accidents from falling. Nature has so clearly marked her intention as to this, in the case of the flowers of ramous plants, that she has deprived of this clothing such as grow on stems that are not branchy, and where they are in no danger from the agitation of the winds. This
may

may be remarked with regard to the flowers of Solomon's seal, of the lily of the valley, of the hyacinth, of the narcissus, of most of the liliaceous, and of plants which bear their flowers isolated, on perpendicular stems.

Flowers have, farther, very curious relations with animals and with Man, from the diversity of their configurations, and from their smells. Those of one species of the orchis represent bugs, and exhales the same unpleasant odour. Those of a species of the arum resembles putrid flesh, and has the infection of it to such a degree, that the flesh-fly resorts thither to deposit her eggs. But those relations, hitherto very superficially investigated, do not come in so properly under this article; it is sufficient for me to have here demonstrated, that they actually have very clearly marked relations with the elements, and especially with the Sun.

When Botanists shall have diffused over this branch of the subject all the light of which it is susceptible, by examining their focuses, the elevation to which they rise above the ground, the shelter, or the reflection of the bodies which are in their vicinity, the variety of their colours, in a word, all the means by which Nature compensates the differences of their several exposures, and they will no longer doubt about those elementary har-

monies; they will acknowledge that the flower, far from presenting an unvarying character in plants, exhibits, on the contrary, a perpetual character of diversity. It is by this, principally, that Nature varies the species in the same genus of plant, in order to render it susceptible of fecundation, on different sites. This explains the reason why the flowers of the great chestnut of India, but originally from America, are not the same with those of the European chestnut; and that those of the fullers-thistle, which thrives on the brink of rivers, are different from those of thistles, which grow in lofty and dry places.

A very extraordinary observation shall serve irrefragably to confirm all that we have just now advanced: it is this, that a plant sometimes totally changes the form of its flowers in the generation which reproduces it. This phenomenon greatly astonished the celebrated *Linnaeus*, the first time that it was submitted to his consideration. One of his pupils brought him, one day, a plant perfectly similar to the linarium, the flower excepted; the colour, the flavour, the leaves, the stem, the root, the calix, the pericarpium, the seed, in a word, the smell, which is a remarkable circumstance, were exactly the same, only its flowers were in form of a tunnel, whereas those of the linarium are gullet-formed. *Linnaeus* imagined, at first,

first, that his pupil intended to put his knowledge to the test, by adapting a strange flower to the stem of that plant; but he satisfied himself that it was a real linarium, the flower of which Nature had totally changed. It had been found among other linaria, in an island, seven miles distant from Upsal, near the shore of the sea, on a sandy and gravelly bottom. He himself put it to the proof, that it re-perpetuated itself in this new state by its seeds. He afterwards found some of it in other places: and, what is still more extraordinary, there were among these last, some which carried on the same stalk flowers tunnel-formed, and flowers gullet-formed.

He gave to this new vegetable the name of *pe-lorum*, from the Greek word *πελωρ*, which signifies prodigy. He afterwards observed the same variations in other species of plants, and among the rest, in the eriocephalous thistle, the seeds of which produce, every year, in the garden of Upsal, the fantastic thistle of the Pyrennées*. This illustrious Botanist accounts for these transformations, as being the effect of a mongrel generation, disturbed by the fecundating farina of some other flower in the vicinity. It may be so; to his opi-

* Upsalian Dissertation, for December, 1744; page 59, note 6.

nion, however, may be opposed, the flowers of the pelorum, and of the linarium, which he found united on the same individual. Had it been the fecundation which transformed this plant, it ought to have given similar flowers in the whole individual. Besides, he himself has observed, that there was not the slightest confusion in the other parts of the pelorum, any more than in its virtues; but this must have been the case, as well as in the flower, had it been produced by a mixture of some strange breed. Finally, the pelorum reproduced itself by seed, which does not take place in any one mongrel species of animals.

This sterility, in mongrel branches, is an effect of the sage consistency of Nature, who cuts off divergent generations, in order to prevent the primordial species from being confounded, and from, at length, disappearing altogether. As to the rest, I pry neither into the causes, nor the means, which she is pleased to conceal from me, because they far transcend my comprehension. I confine my enquiries to the ends which she kindly unfolds; I confirm myself in the belief, from the variety of flowers in the same species, and sometimes in the same individual, that they serve, in certain cases, as reflectors to vegetables, for the purpose of collecting, conformably to their position, the rays of
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the Sun on the parts of fecundation ; and, in other cases, as parasols, to put them under covert from excessive heat.

Nature deals by them, nearly, as she does by animals which are exposed to the same variations of Latitude. In Africa, she strips the sheep of the woolly fleece, and gives her sleek smooth hair, like that of the horse : and to the North, on the contrary, she clothes the horse with the shaggy fur of the sheep. I have been an eye-witness of this double metamorphosis, at the Cape of Good-Hope and in Russia. I have seen at Petersburg, Norman and Neapolitan horses, whose hair, naturally short, was so long and so frizzled, in the middle of Winter, that you would have believed them covered with wool like sheep. It is not without reason, therefore, that the ancient proverb says : *GOD tempers the wind to the shorn lamb* : and when I behold his paternal hand varying the fur of animals conformably to the degree of heat and cold, I can easily believe, that it varies, in like manner, the mirrors of flowers conformably to the Sun. Flowers, then, may be divided, with relation to the Sun, into two classes : into reverberating flowers, and flowers in form of a parasol.

If there be any constant character in plants, we must look for it in the fruit. It is thitherward

that Nature has directed all the parts of vegetation, as to the principal object. That saying of WISDOM itself, *by their fruits ye shall know them*, is, at least, as applicable to plants as to the human species.

We shall examine, therefore, the general characters of plants, with relation to the places where their seeds are accustomed to grow. As the animal kingdom is divided into three great classes, quadrupeds, volatiles, and aquatics, relatively to the three elements of the Globe; we shall, in like manner, divide the vegetable kingdom into ærial or mountain-plants; into aquatics, or those of the shores; and into terrestrial, or those of the plains. But as this last participates of the two others, we shall not dwell upon it; for, though I am persuaded that every species, nay, that every variety, may be referred to some particular site of the earth, and may grow there in it's highest degree of beauty, it is sufficient to say as much of it here as may be necessary to the prosperity of a small garden. When we shall have traced invariable characters, in the two extremities of the vegetable kingdom, it will be easy to refer to the intermediate classes, those which are adapted to them. We shall begin with the plants of the mountains.

Elementary Harmonies of Plants with the Water and the Air, by Means of their Leaves and their Fruits.

When the AUTHOR of Nature designed to clothe with vegetables even the highest and steepest pinnacles of the Earth, He first adapted the chains of mountains to the basons of the seas which were to supply them with vapours; to the course of the winds which were to waft them thither, and to the different aspects of the Sun by which they were to be heated. As soon as these harmonies were established between the elements, the clouds ascended out of the Ocean, and dispersed themselves over the most remote parts of the Continents. There they distilled, under a thousand different forms, in fogs, in mists, in dews, in rains, in snows. They descended from the heights of the Atmosphere in every possible variety of manner; some in a tranquil air, such as our Spring showers, came down in perpendicular drops, as if they had been strained through a sieve; others, driven by the furious winds, beat horizontally on the sides of the mountains; others fell in torrents, like those which, for nine months of the year, inundate the Island of Gorgona, placed in the heart of the Torrid Zone, in the burning Gulf of Panama. There were some which accumulated

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themselves,

themselves, in mountains of snow, on the inaccessible summits of the Andes, to cool, by their effusions, the Continent of South-America, and, by their icy Atmosphere, the vast expanse of the Pacific Ocean. In a word, mighty rivers flowed over regions where the rain never descends, and the Nile watered the plains of Egypt.

Then GOD said: "Let the Earth bring forth
"grass, the herb yielding seed, and the fruit-tree
"yielding fruit after his kind, whose seed is in itself
"upon the Earth." At the voice of the All-Mighty, the vegetables appeared with organs perfectly fitted to collect the blessings of Heaven. The elm arose on the mountains which skirt the Tanaïs, clothed with leaves in form of a tongue; the tufted box started from the brow of the Alps; and the prickly caper-tree from the rocks of Africa, with leaves hollowed into spoons. The pines on the sandy Norwegian hills attracted the vapours which were floating in the air, with their slim foliage, disposed like a Painter's pencil; the verbascum displayed it's broad leaves on the parched sand, and the fern presented, on the hill, it's fan-like foliage to the rainy and horizontal winds. A multitude of other plants, from the bosom of the rocks, from strata of flint, nay, even from marble incrustations, drunk in the waters of Heaven by cornets, by sandals, and by cruets. From the cedar
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of Lebanon down to the violet which perfumes the grove, there was not one but what presented it's large goblet, or it's tiny cup, conformably to it's necessity, or it's station.

This adaptation of the leaves of plants, in elevated situations, for receiving the descending distillations of the rain, is varied without end; but the character of it is discernible in most, not only in their concave forms, but likewise in a little canal, scooped out on the pedicle by which they are attached to their branches. It has something of a resemblance to that which Nature has traced on the upper lip of Man, to receive the humours which descend from the brain. It is particularly perceptible on the leaves of artichokes, which, being of the nature of thistles, agree with dry and sandy situations. These have, besides, collateral awnings to prevent the loss of any of the water that falls from Heaven. Plants which grow in places very hot, and very parched, sometimes have their stems or their leaves transformed entirely into a canal. Such are the aloes of the island of Zocotara, in the mouth of the Red-Sea, or the prickly taper of the Torrid Zone. The aqueduct of the aloes is horizontal, and that of the taper perpendicular.

What

What has prevented Botanists from remarking the relations which the leaves of plants have with the waters that feed and refresh them, is their seeing them every where nearly of the same form, in the valleys, as on the heights; but though mountain-plants present foliages of every kind of configuration, you may easily discern, from their aggregation in form of pencils, or fans, from the gatherings of the leaves, or other equivalent signs, that they are destined to receive the rain water, but chiefly from the aqueduct which I have just mentioned. This aqueduct is traced on the pedicle of the smallest leaves of mountain-plants; by means of it, Nature has rendered the forms themselves of aquatic-plants susceptible of vegetation in the most parched situations.

The bulrush, for example, which is only a round and full straw, that grows by the water-side, did not appear susceptible of collecting any humidity in the air, though it is very well suited to lofty situations, from its capillaceous form, which, like that of gramineous plants presents nothing to the wind to lay hold of. In fact, if you consider the different species of rush which clothe the mountains in many parts of the world, such as that called *icho*, on the lofty mountains of Peru, the only vegetable almost that grows there, and those which thrive with ourselves in dry sands, or on heights,
you

you would, at the first glance, believe them similar to the rush of marshy places ; but with a little attention, and not without astonishment, you will observe that they are hollowed into a furrow the whole of their lengthwise direction. They are, like other rushes, convex on one side, but they differ from them essentially, in that they are all concave on the other ; I was enabled to distinguish, by this same character, the *spatha*, which is a rush of the mountains of Spain, and is now frequently manufactured at Paris into cordage for their draw-wells.

Many leaves, even of the plants of the plains, assume, on their first springing up, this form of little furrow, or spoon, as those of the violet, and of most gramineous plants. You may perceive, in the Spring, the young tufts of these raising themselves upright toward Heaven, like paws, to catch the falling drops, especially when it begins to rain ; but most plants of the plains lose their gutter as they expand. It has been bestowed on them only during the season when it was necessary to their growth. It is permanent only in the plants of the mountains. It is traced, as has been mentioned, on the pedicle of the leaves, and conducts the rain-water into the tree, from the leaf to the branch : the branch, by the obliquity of its position, conveys it to the trunk, from whence it descends

descends to the root, by a series of successive dispositions. If you pour water gently over the leaves of a mountain-shrub, which are the farthest from it's stem, and you will perceive it pursue the progress which I have just indicated, and not a single drop will be lost on the ground.

I have had the curiosity to measure, in some mountain-plants, the inclination which their branches form with their stem; and I have found, in at least a dozen of different species, as in the fern, the thuia, and the like, an angle of about thirty degrees. It is very remarkable, that this degree of incidence is the same with that which is formed, in a flat country, by the course of many rivulets and smaller rivers, with the great rivers into which they discharge themselves, as may be ascertained by reference to maps. This degree of incidence appears to be the most favourable to the efflux of many fluids, which direct themselves toward one single line. The same Wisdom has regulated the level of the branches in trees, and the course of the stream through the plains.

This inclination undergoes some varieties in certain mountain-trees. The cedar of Lebanon, for example, sends forth the lower parts of it's branches, in an upward direction, toward Heaven, and lowers their extremities, by bending them
downward

downward to the Earth. They have the attitude of command which is suited to the king of vegetables, that of an arm raised up into the air, with the hand gently inclining. By means of the first disposition, the rain-water is conveyed along the sloping branch to the trunk; and by the second, the snows, in the regions of which it takes delight to dwell, slide away from off its foliage. Its cones have, in like manner, two different attitudes; for it inclines them, at first, toward the Earth, to shelter them at the season of their flowering; but when they are fecundated, it erects them toward Heaven. The truth of these observations may be confirmed by referring to a young and beautiful cedar in the Royal Garden, which, though a stranger, has preserved, in the midst of our climate, the air of a King, and the majestic port of Lebanon.

The bark of most mountain-trees is equally adapted for conducting the rain-water from the branches to the roots. That of the pine is in large perpendicular ribs; that of the elm is cleft and chinked longitudinally; that of the cypress is spongy, like the coat of flax.

The plants of mountains, and of dry grounds, have a farther character, which is, in general, peculiar to them: it is that of attracting the water
which

which floats in the air, in imperceptible vapours. The *parietaria* (pellitory) which has derived it's name from the Latin word *pariete*, (wall) because it grows on the sides of walls, has it's leaves almost always in a humid state. This attraction is common to most trees of the mountains. Travellers unanimously assure us, that there is, in the mountains of the Island of Ferro, a tree, which furnishes every day, to that island, a prodigious quantity of water. The islanders call it *garoé*, and the Spaniards *santo*, from it's singular utility. They tell us it is always surrounded with a cloud, which distils copiously along it's leaves, and fills with water the large reservoirs which are constructed at the root of this tree, affording an abundant supply for the island.

This effect is, perhaps, somewhat exaggerated, though related, in nearly the same terms, by persons of different Nations: but I give full credit to the general fact. The real case I take to be this, it is the mountain which attracts from afar the vapours of the Atmosphere, and that the tree, situated in the focus of attraction, collects them around it.

Having frequently spoken, in the course of this Work, of the attraction of the summits of many mountains, the Reader, perhaps, will not be displeased,

pleased, if I present to him, in this place, an idea of that branch of the hydraulic architecture of Nature. Among a great number of curious examples, which I might produce to this purpose, and which I have collected, as an addition to my materials on the subject of Geography, I beg leave to present one, which I have extracted, not from a systematic Philosopher, but from a simple and unaffectedly sprightly traveller of the last age, who relates things as he saw them, and without pretending to deduce consequences of any kind whatever. It is a description of the summits of the Island of Bourbon, situated in the Indian Ocean, extending to the twenty-first degree of South Latitude. It is copied from the writings of M. *de Villers*, who was then Governor of that island, under the East-India Company. It is published in the journals of the first voyages made by our French Navigators into *Arabia-Felix*, about the year 1709, and given to the World by M. *de la Roque*. See that Work, page 201.

“Of those plains,” says M. *de Villers*, which are upon the mountains (of Bourbon), “the most remarkable, though no account has hitherto been given of it, is that to which they have given the name of the Plain of the Cafres, from a tribe of that People, slaves to the inhabitants of the Island, who went thither to conceal themselves,

“ selves, after they had run away from their mas-
“ ters. From the shore of the sea, you rise by a
“ gentle ascent, for seven leagues together, in or-
“ der to reach this plain, by the single path that
“ leads to it, along the river of Saint Stephen: it is
“ possible, however, to ride up on horseback. The
“ soil is good and smooth to about a league and a
“ half; on this side the plain, planted with large and
“ beautiful trees, the foliage of which, as it falls,
“ serves for food to the tortoises, which are to be
“ found there in great numbers.

“ The height of this plain may be estimated
“ at two leagues above the Horizon; it accord-
“ ingly appears from below to be quite lost in the
“ clouds. It's circumference may be about four
“ or five leagues. The cold is there insupport-
“ able, and *a continual fog, which wets as much as*
“ *rain*, prevents your seeing objects ten paces dis-
“ tant; as it falls in the night, you may see
“ through it more clearly than by day: but then
“ it freezes dreadfully, and in the morning, before
“ sun-rise, the plain is frozen all over.

“ But what strikes the eye of the beholder as
“ very extraordinary, are certain elevations of
“ ground, cut out almost in form of round co-
“ lumns, and of a prodigious height; for they
“ cannot be much lower than the turrets of Notre-
“ Dame

“ Dame at Paris. They are put down like pins
“ on the skittle-ground, and the resemblance is
“ so strong, that you may easily mistake on reck-
“ oning them: they go by the name of *pitons*
“ (pins). If you wish to stop by one of those
“ eminences to take rest, such of your company as
“ are not inclined to repose, but want to go for-
“ ward, must not withdraw so much as two hun-
“ dred paces, otherwise they will be in great dan-
“ ger of not finding again the point of separation,
“ these pins are so many in number, all similar
“ in form, and so much arranged in the same
“ manner, that the Creoles, who are native there,
“ are themselves liable to mistake.

“ For this reason it is, that, in order to prevent
“ the unpleasant consequences of such an error,
“ when a company of travellers take station at
“ one of the pins, if any are disposed to make a
“ farther excursion, they leave a person at the
“ place of rendezvous, to make a fire, or raise a
“ smoke, which may serve to direct, and bring
“ back the strayers; and if the *fog* be *so thick*,
“ which is frequently the case, as to hinder the fire
“ or the smoke from being seen, they provide
“ themselves with a kind of large shells, one of
“ which is left with him who keeps station at the
“ pin; another is carried off by the separating
“ party; and when they wish to return, some one

“ blows violently into the shell, as into a trumpet,
“ which emits a very shrill sound, and capable of
“ being heard at a great distance ; this is answered
“ by the other, and being repeated as often as is
“ necessary, they are easily recovered from stray-
“ ing, and collected at the point of departure.
“ Without such precautions, the traveller might
“ be bewildered.

“ In this plain are many aspin-trees, and they
“ are always green. Other trees are covered
“ with a moss of more than a fathom in length
“ around their trunk and large branches. They
“ are withered, without foliage, and so impreg-
“ nated with moisture, that it is impossible to
“ make them take fire. If, with much difficulty,
“ you are able to kindle some of the smaller
“ boughs, it is only a dark fire without flame,
“ which emits a reddish smoke, that defiles the
“ meat instead of roasting it. You can hardly
“ find a spot in this plain on which to kindle a
“ fire, unless by looking about for some small ele-
“ vation round the peaks ; for the soil of the plain
“ is so humid, that the water every where spouts
“ out, so that you are continually in mud, and
“ moistened up to the calf of the leg. Great
“ numbers of blue birds are to be seen there nest-
“ ling in the herbage, and among the aquatic
“ ferns. This plain was unknown before the de-
“ scription

“ fersion of the Cafres. In order to get down,
“ you must return by the same way that you
“ ascended, unless you choose to run the risk of
“ another path, which is very rough, and dange-
“ rously steep.

“ From the plain of the Cafres may be seen the
“ mountain known by the name of *Trois Salases*,
“ from the three points of that rock, the loftiest
“ in the Island of Bourbon. All it's rivers issue
“ from thence, and it is so steep on every side, that
“ there is no possibility of climbing it.

“ There is, besides, in this island, another plain,
“ called the Plain of Silaos, higher than that of
“ the Cafres, and of no greater value: it is ex-
“ tremely difficult to get up to it.”

In the lively description of our Traveller, we must overlook some errors in Physics, such as his assigning to the Plain of the Cafres an elevation of two leagues above the Horizon. He had not learned from the barometer and thermometer, that there is no such elevation on the face of the Globe, and that, at the perpendicular height of one league only, the freezing point is invariable. But from the thick fog which surrounds those peaks, from that continual mist which wets as much as rain, and which falls during the night, it is evidently perceptible,

perceptible, that they attract to them the vapours, which the Sun raises out of the Sea in the day-time, and which disappear in the night. Hence is formed that sheet of water which inundates the Plain of the Cafres, and from which most of the brooks and rivulets that water the island take their rise. You may equally distinguish a vegetable attraction in those ever-green aspens, and those other trees, at all times humid, which it is impossible to kindle into flame.

The Island of Bourbon is almost round, and rises out of the Sea in the shape of half an Orange. On the highest part of this hemisphere are situated the Plains of Silaos and of the Cafres, where Nature has placed those labyrinths of peaks continually involved in fogs, planted like nine-pins, and elevated like so many turrets.

Did time and room permit, I could make it evident, that there are a multitude of similar peaks on the chains of lofty mountains, of the Cordeliers, of Taurus, and others, and at the centre of most islands, without admitting the possibility of supposing, though the opinion be current, that they are the remains of a primitive Earth raised to that height; for what must have become, as has been already demanded, of the wreck of that Earth, the pretended testimonies of which arise on every
hand

hand over the surface of the Globe? I could demonstrate that they are placed in aggregations, and in situations adapted to the necessities of the countries of which they are, in some sense, the reservoirs; some in a labyrinth, as those of the Island of Bourbon, when they are on the summit of a hemisphere, from whence they are destined to distribute the waters of Heaven in every direction; others in form of a comb, when they are placed on the extended crest of a chain of mountains, as the pointed peaks of the chain of Taurus and of the Cordeliers; others grouped into pairs, into threes, according to the configuration of the territory which they are to water. They are of many forms, and of different constructions: some of them are incrustations of earth, as those of the Plain of the Cafres, and of some of the Antilles Islands, and which are besides so steep, as to be entirely inaccessible. Those incrustations of earth demonstrate, that they have, at once, fossil and hydraulic attractions.

There are others which present long needles of solid and naked rock; others are of a conical form; others are flattened as a table; such as that of Table-mountain, at the Cape of Good-Hope, where you may frequently see the clouds accumulate, and spread like a table-cloth. Some are not apparent, but entirely involved in the side of

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mountains,

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mountains, or in the bosom of plains. They are all distinguishable by the fogs which they attract around them, and by the sources which emit their streams in the vicinity. Nay, you may rest assured, that there is no source but in the neighbourhood of some quarry of hydro-attractive, and, for the most part, of metallic stone. I ascribe the attraction of those peaks to the vitreous and metallic bodies of which they are composed: and I am persuaded it might be possible to imitate this architecture of Nature, and to form, by means of the attraction of such stones, fountains of water in the most parched situations. In general, vitreous bodies, and stones susceptible of polish, are very proper for this purpose; for it is observable, that when water is diffused in great quantities through the air, as at the time of a general thaw, it is first attracted, and attaches itself, to the glass-windows and the polished stones of our houses.

I have frequently seen on the summit of the mountains, in the Isle of France, effects similar to those of the peaks of the Plain of the Cafres, in the Island of Bourbon. The clouds collect there incessantly around their peaks, which are steep and pointed, like pyramids. Some of those peaks terminate in a rock of a cubical form, which crowns them like a chapter. Such is that one which they call *Piterbooth*, after the name of a
Dutch

Dutch Admiral; it is one of the loftiest in the Island.

Those peaks are formed of solid rock, vitrifiable, and mixed with copper: they are real electrical needles, both in form and substance. The clouds perceptibly deviate from their course to collect upon them, and there accumulate, sometimes to such a degree, that the pinnacles become totally invisible. They thence descend into the cavity of the vallies, along the declivities of the forests, which likewise attract them, and there dissolve into rain, frequently forming rainbows on the verdure of the trees. This vegetable attraction, of the forests of that island, is in such perfect harmony with the metallic attraction of the peaks of it's mountains, that a field situated in an open place, in their vicinity, very often suffers for want of rain, whereas it rains almost the whole year round in the woods, which are not above a gunshot distant. It was by the destruction of part of the trees that clothed the heights of the island, that most of the brooks which watered it have been dried up: and now nothing remains of them but the empty channel.

To the same injudicious management, I ascribe the sensible diminution of a considerable part of the rivers of Europe, both great and small; as is

evident from a simple inspection of their ancient bed, which is much broader and deeper than the mass of water at this day transmitted by them to the Ocean. Nay, I am persuaded, that to this cause we must ascribe the dryness of the more elevated provinces of Asia, those of Persia, in particular, the mountains of which have, no doubt, been injudiciously stripped of their trees, by the first tribes who inhabited them. I am decidedly of opinion, that were we to plant in France mountain-loving trees, on the high grounds, and at the sources of our rivers, their ancient volume of water might be restored, and many rivulets might be made to re-assume their current through our plains, though they have long since ceased to flow. It is neither among the reeds, nor in the depth of the valley, that the Naiads conceal their exhaustless urns, as Painters represent them, but at the summit of rocks crowned with wood, and towering to the Heavens.

There is not a single vegetable, the leaf of which is disposed to receive the rain-water on the mountains, whose seed is not formed in a manner the best adapted to raise itself thither. The seeds of all mountain-plants are volatile. By inspecting their leaves, it is possible to ascertain the character of their grains, and by inspecting the grains, that of their leaves, and thence to infer the elementary character

character of the plant. By mountain-plants, I here wish to be understood to mean all those which grow in sandy and parched situations, on hillocks, in rocks, on steep ridges by the highway's side, in walls, and, in one word, at a distance from water.

The seeds of thistles, of blue-bottles, of dandelion, of succory, and many others, are furnished with pinions, with plumes, with tufts, and various other means of rising, which convey them to prodigious distances. Those of the grasses, which likewise travel very far, are provided with a light chaffy coat, and with bearded husks. Others, such as those of the yellow gilly-flower, are cut into thin scales, and fly by the slightest breath of the wind, and plant themselves in the most inconsiderable crevice of a wall. The seeds of the largest mountain-trees are no less volatile. That of the maple has two membranous pinions, similar to the wings of a fly. That of the elm is cased in the midst of an oval thin leaf. Those of the cypress are almost imperceptible. Those of the cedar are terminated by broad and thin plates, which, in their aggregated state, compose a cone. The grains are in the centre of the cone; and when arrived at maturity, the thin membranes, to which they adhere, separate from each other, like the
cards

cards in a pack, and each of them flies off with its own little kernel. (*See the annexed Plate.*)

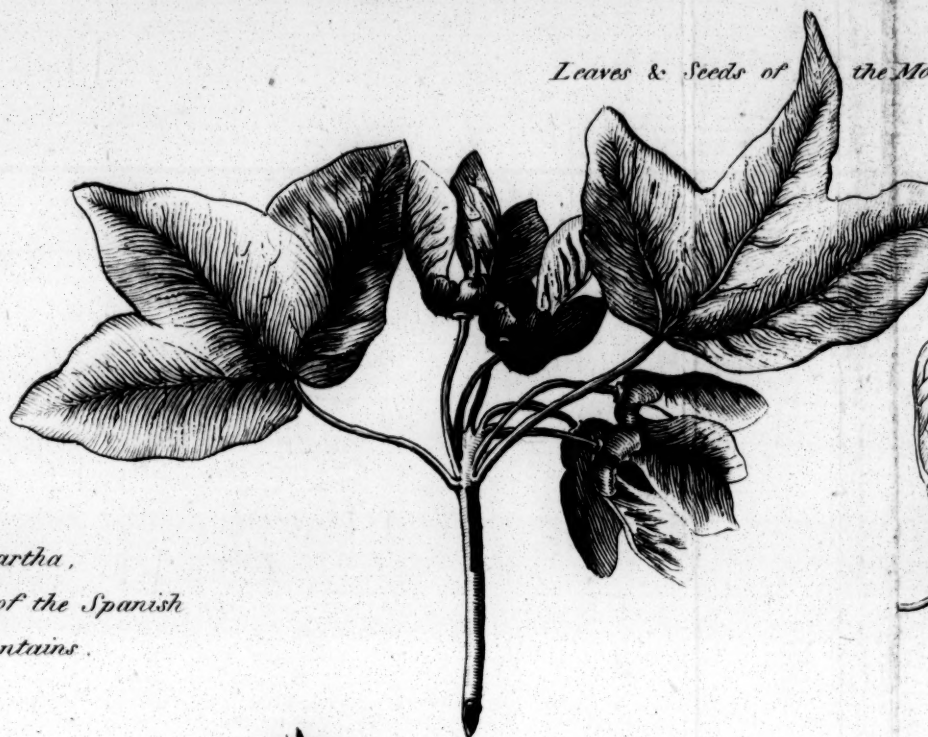
The seeds of mountain-plants, which appear too heavy for flying, are furnished with other resources. The pease of the balsamine have pods whose elasticity darts them to a considerable distance. There is likewise a tree in India, the name of which I do not now recollect, that, in like manner, discharges its seeds with a noise like that of a musket fired off. Those which have neither tufts, nor pinions, nor springs, and which, from their weight, seem condemned to remain at the foot of the vegetable which produced them, are, in very many cases, those which travel the farthest. They fly off with the wings of a bird. It is thus that a multitude of berries and shell-fruits re-sow themselves. Their seeds are inclosed in stony incrustations, not capable of being digested. They are swallowed by the birds, which carry them off, and plant them in the cornices of towers, in the clefts of rocks, on the trunks of trees, beyond rivers, nay, beyond oceans. By such means it was that a bird of the Moluccas re-peopled, with the nutmeg plant, the desert islands of that archipelago, in defiance of all the efforts of the Dutch, who destroy those trees in every place where they cannot be subservient to their own commerce.

This

is

LEAVES WITH AN AQUEDUCT, AND VOLATILE

Leaves & Seeds of the Mo



Spartha,
or rush of the Spanish
Mountains.



Stump of the
Spartha, with
its Gutter.

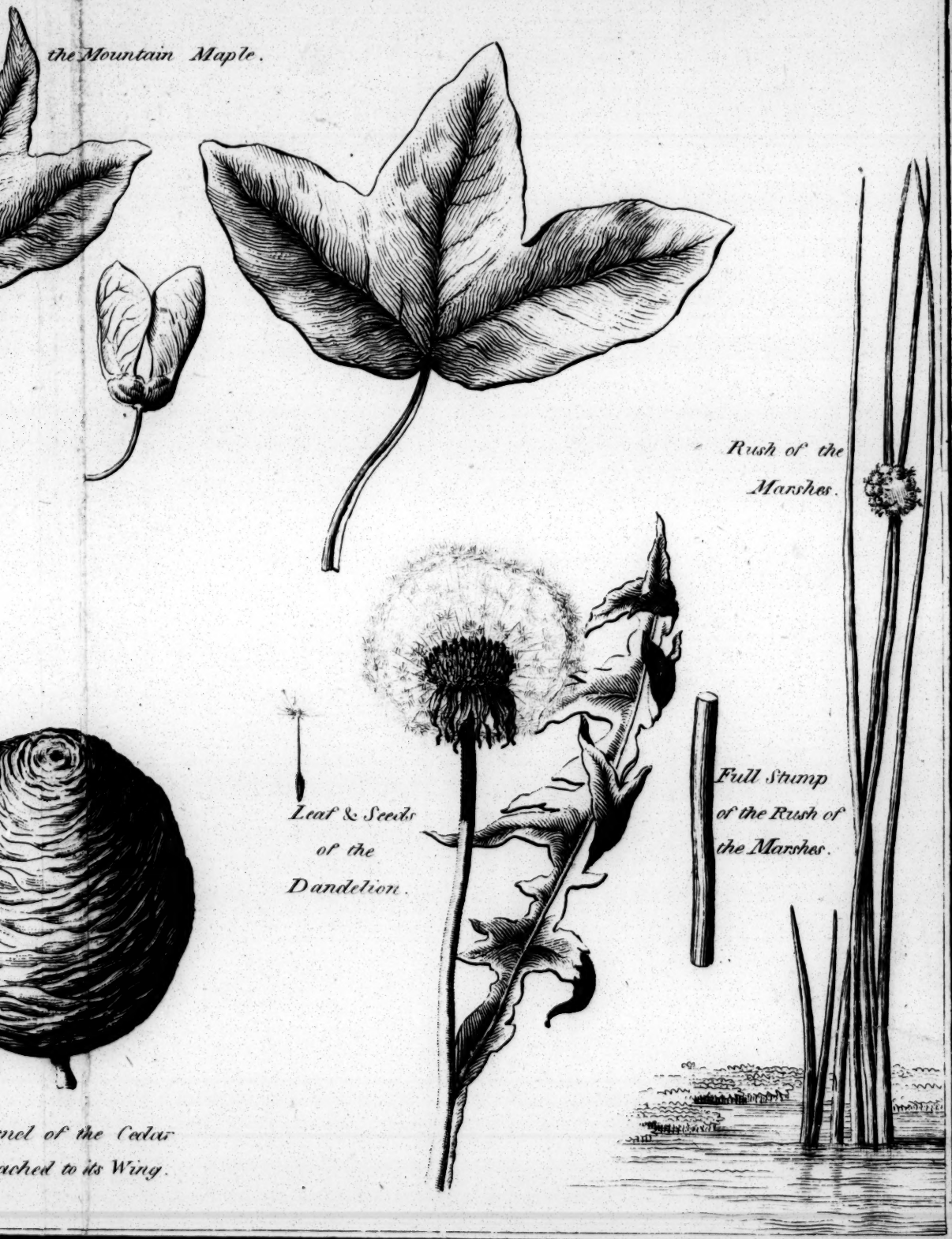


Leaf & Cone
of the Cedar
of Lebanon.



Kernel of the
attached to its

OF VOLATILE FRUITS OF MOUNTAIN VEGETABLES.



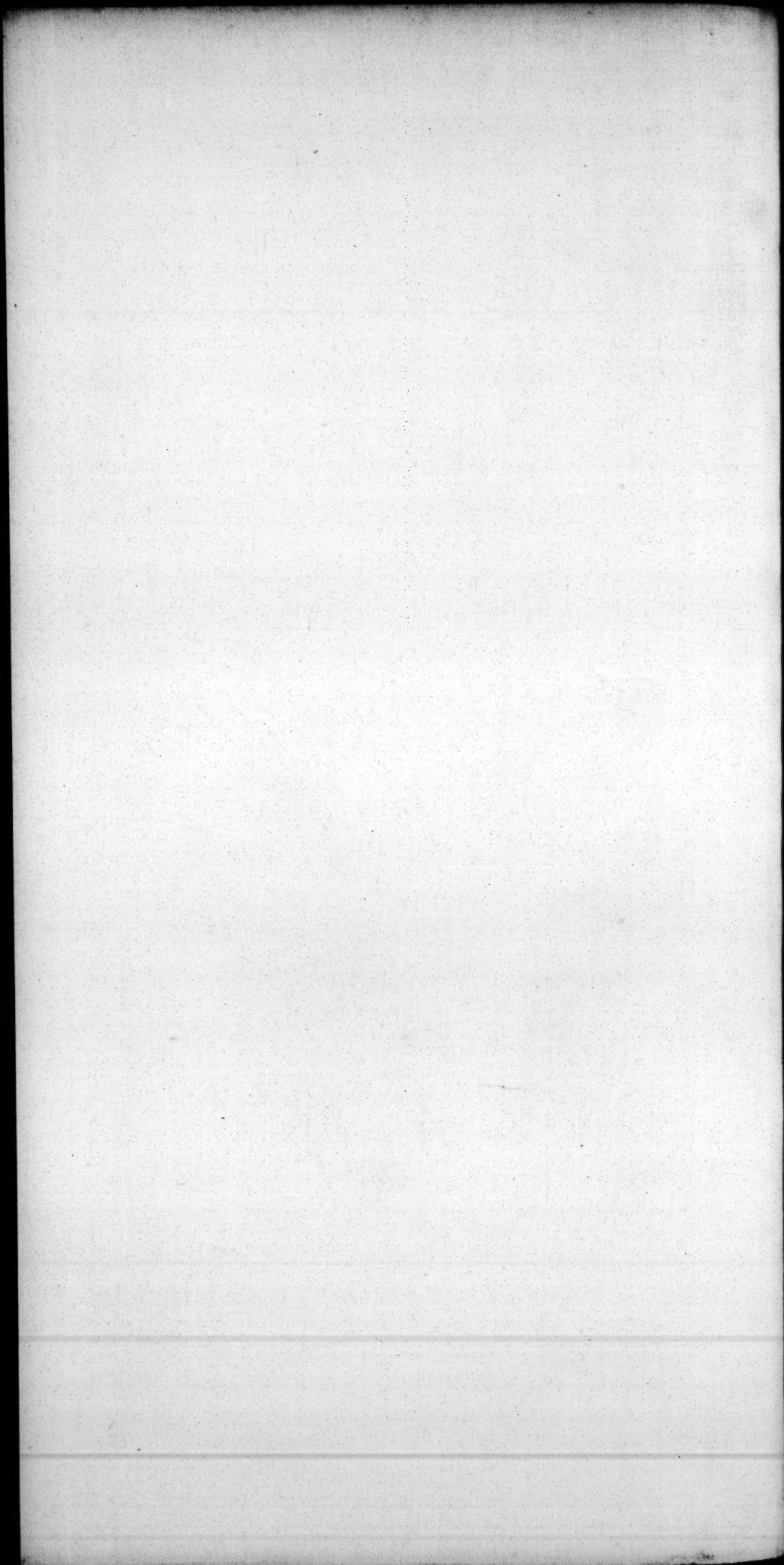
the Mountain Maple.

Rush of the Marshes.

Leaf & Seeds of the Dandelion.

Full Stump of the Rush of the Marshes.

Fruct of the Cedar attached to its Wing.



This is not the place for bringing forward the relations which vegetables have to animals. It is sufficient to observe, as we go along, that most birds re-sow the vegetable which feeds them. Nay, we find, without going from home, quadrupeds which convey to a great distance the seeds of the grasses. Such, among others, as do not chew the cud, horses for instance, whose dung is hurtful to the meadows, for an obvious reason, they introduce into them a variety of foreign herbs, as the heath and the short furze, the seeds of which they are unable to digest. They re-sow, besides, a great many others, which adhere to their hair, by the motion of their tail simply. There are quadrupeds of small size, such as the dormouse, the hedge-hog, and the marmot, which convey to the most elevated regions of the mountains, acorns, beech-mast, and chestnuts.

It is singularly worthy of remark, that volatile seeds are produced in much greater number than those of other species; and in this, we are called upon to admire the intelligence of that Providence which foresaw every thing, and arranged all accordingly. The elevated situations for which they are destined, were exposed to be speedily stripped of their vegetables, by the declivity of their soil, and by the rains, which have a continual tendency to lower them. By means of the volatility of grains, they

they are become, of all the places of the Earth, the most prolific in plants. In the mountains is deposited the Botanist's treasure.

It cannot be too frequently repeated, The remedies provided by Nature always surmount the obstacles which she has opposed; and her compensations ever exceed her gifts. In truth, if you except the inconveniencies of declivity, a mountain presents to plants the greatest variety of exposures. In a plain they have the same Sun, the same degree of humidity, the same soil, the same wind; but if you ascend a mountain, situated in our Latitude, only twenty-five fathoms of perpendicular height, you change your climate as much as if you had travelled twenty-five leagues northward; so that a mountain of twelve hundred fathoms perpendicular height, would present us with a scale of vegetation as extensive as that of twelve hundred leagues along the Horizon, which is nearly our distance from the Pole: both the one and the other would terminate in a region of perpetual ice. Every step we take upon a mountain, whether ascending or descending, gives us a change of Latitude; and if we encompass it round and round, every step changes our Longitude. We shall fall in with points where the Sun rises at eight o'clock in the morning; others, at ten o'clock; others, at noon. We should find an infinite

finite variety of exposures; of cold toward the North, of heat to the South, of rain to the West, of drought to the East; without taking into the account the different reflections of heat in sands, rocks, bottoms of vallies, and lakes, which modify them a thousand various ways.

We must proceed farther to observe; and who can do it without profound admiration? that the season of the maturity of most volatile seeds takes place toward the commencement of Autumn; and that, from an effect of the universal Intelligence, which constrains all the parts of Nature to act in concert, then it is that we have the most violent gales of wind, about the end of September or beginning of October, called the equinoctial winds. These winds blow in all parts of the Continents, from the bosom of the seas to the mountains which are in correspondence with them. Not only do they convey thither the volatile grains which have then attained to a state of maturity; but likewise blend with these thick clouds of dust, which they carry off from lands dried up by the burning heats of Summer, and particularly from the shores of the Sea, where the incessant motion of the billows, which there break, and continually toss the pebbly strand backward and forward, reduce the hardest bodies to an impalpable powder.

Those

Those emanations of dust are in many places so copious, that I could produce a variety of instances of vessels covered with them, as they were crossing gulfs, though more than six leagues distant from land. They are so troublesome in the loftier provinces of Asia, that all travellers who have visited Pekin assure us, it is impossible to walk the streets of that city, for a considerable part of the year, without having the face veiled. Thus there are rains of dust which repair the summits of the mountains, as there are rains of water which feed their sources. Both the one and the other issue from the Sea, and return to it by the course of the rivers, which are perpetually conveying thither, their constant tribute of waters and sands. The maritime winds unite their efforts toward the autumnal equinox, transport from the circumference of the Continents, to mountains the most remote from them, the seeds and the manure which had flowed from thence, and sow meadows, groves, and forests, on the sides of precipices, and the most inaccessible peaks. Thus the leaves, the stems, the seeds, the birds, the seasons, the seas, and the winds, concur, in a most wonderful manner, to keep up the vegetation of the mountains.

I have been mentioning the relations of plants to mountains; I am mortified that it is not in
my

my power here to insert the relations which mountains themselves have with plants, according to my original intention. All that I can, at present, say on the subject is, that so far are mountains from being the productions of a centrifugal force, or of fire, or of earthquakes, or of water-courses, I know of, at least, ten different species, each of which has a configuration the most perfectly adapted for keeping up, in every particular Latitude, the harmony of the elements relatively to vegetation. Each of them has, moreover, vegetables and quadrupeds peculiar to itself, and which are not elsewhere to be found: this proves to a demonstration, that they are not the work of chance. Finally, among that inconceivable number of mountains which cover the greatest part of the five Zones, and especially the Torrid and the Icy Zones, there is but one single species, the least considerable of all, which presents to the water-courses projecting and retreating angles in correspondence. This, however, is no more their work than the basin of the seas is itself the work of the Ocean. But this interesting subject, of an extent too considerable to admit of it's being here introduced, belongs, besides, to the province of Geography.

Let us now proceed to display the harmonies of aquatic plants.

These

These have dispositions entirely different in their leaves, the bearing of their branches, and, above all, in the configuration of their seeds. Nature, as has already been observed, in order to vary her harmonies, only employs, in very many cases, positive and negative characters. She has bestowed an aqueduct on the pedicle of the leaves of mountain-plants; she withdraws it from those which grow by the side of the waters, and transforms them into aquatic plants. These, instead of having their leaves hollowed out into gutters, are clothed with leaves smooth and sleek, such as the corn-flag, which bears them in form of a poignard's blade, or swelling in the middle like a sword-blade, as those of the species of reed called typha, that common sort, the stem of which the Jews put into the hand of JESUS CHRIST. Those of the nymphæa are plane, and rounded in form of a heart. Some of these species affect other forms, but their long tails are uniformly destitute of a canal. Those of the bulrush are round like a pipe. There is an endless variety of rushes on the brink of morasses, rivulets, and fountains. You will find them of all sizes, from those which have the fineness of a hair, up to the species which grows in the river of Genoa, as large as a cane. Whatever difference there may be in the jointing of their stalks and of their pannicles, they all have,
in

in their plan, a round or elliptical form. You will find those species alone which grow in parched situations, to be fluted and hollowed on their surface. When Nature intends to render aquatic plants susceptible of vegetation on the mountains, she bestows aqueducts on their leaves ; but when, on the contrary, she means to place mountain-plants by the water's-side, she withdraws it. The aloës of the rock has it's leaves hollowed into a scoop ; the aloës of the water has them full. I am acquainted with a dozen species of mountain-fern, every one of which has a small fluting along it's branches, and the only species of the marshes, which I know, wants it. The bearing of it's branches is likewise very different from that of the others. The first rears them toward Heaven, the last bears them almost horizontally.

If the leaves of mountain-plants are constructed in the best manner possible for collecting, at their roots, the waters of Heaven, which they have not always at command ; those of aquatic plants are frequently disposed in such a manner, as to remove them, because they are destined to grow in the bosom of water, or in it's vicinity. The leaves of trees which love the water's side, as the birch, the aspin, and the poplar, are attached to long and pendent tails. There are others which bear their leaves disposed in form of tiles, as the great chest-

nut of India and the walnut. Those of plants which grow in the shade, around the trunk of trees, and which derive, by their roots, the humidity collected by the foliage of the tree, as the french-bean and the convolvulus, have a similar bearing. But those which grow entirely under the shade of trees, and which have scarcely any roots, as mushrooms, have leaves, that so far from pointing toward Heaven, are turned downward to the earth. The greatest part are formed on the upper side into a thick parasol, to prevent the Sun from drinking up the moisture of the soil in which they grow; and they are divided, on the under side, into thin leafy plates, for receiving the vapours which exhale from the ground, nearly as those of the horizontal wheel of a fire-engine receives the steam of the boiling water which makes it to turn about. They have, besides, several other means of watering themselves by these exhalations. There are many numerous species, lined with tubes, others are stuffed with sponges. There are some whose pedicle is hollow inwardly, and which, bearing a chapter a-top, there collect the emanations of their soil, as in an alembic. Thus, there is not a particle of vapour in the Universe that goes to waste.

What has just now been said of the inverted forms of mushrooms, of their leafy plates, of the
tubes

tubes and sponges with which they are lined, for receiving the vapours exhaled from the ground, confirms what was advanced respecting the use of the leaves of mountain-plants, hollowed into gutters, or constructed into the form of a pencil, or of a fan, for receiving the waters of Heaven. But aquatic plants, which had no need of such recipients, because they thrive in water, have, if I may so express myself, a repulsive foliage. I shall here present an object of comparison, calculated to produce conviction of the truth of those principles: for example, the mountain-box-tree, and the caper-plant of the rocks, have their leaves hollowed into a spoon form, with the concavity turned toward Heaven; but the vaccinium of the marshes, (cranberry) or *vaccinia palustris*, which is likewise furnished with concave leaves, bears them inverted, with the cavity turned toward the earth. From this negative character, I was enabled to distinguish, as a plant of the marshes, a very rare plant in the Royal Garden, which I saw for the first time. It is the *letum palustre*, which grows in the marshes of the Labrador country. Its leaves, formed like little coffee-spoons, are all inverted; their convex side being turned toward Heaven. The water-lentil of our marshes, as well as the typha of our rivers, has the middle of its leaf swelled.

Botanists, on observing leaves nearly similar in plants, on the brink of the water, and on the heights of mountains, never entertained a suspicion, that they could answer purposes so different. Many of them, no doubt, are persons of profound erudition; but their learning is rendered entirely useless to them, because their method constrains them to proceed in one single track, and their system indicates to them only one kind of observations. This is the reason that their most numerous collections, frequently, present nothing but a mere vocabulary. The study of Nature is spirit and intelligence simply. Her vegetable order is an immense volume of which plants form the thoughts, and the leaves of those very plants, the letters. Nay, there is not a very great number of primitive forms in the characters of this alphabet: but by means of their various assemblages, she forms, as we do with ours, an infinite number of different thoughts. As it is with language, in order totally to alter the meaning of an expression, all that she has, in many cases, to do, is to change an accent. She places rushes, reeds, arums with a sleek foliage and a full pedicle, on the banks of rivers: she traces an aqueduct in the leaf, and transforms them into rushes, reeds, and arums of the mountains.

We

We must, at the same time, be carefully on our guard against generalizing these means; otherwise they will quickly betray us into a misapprehension of her procedure. For example, certain Botanists, having suspected that the leaves of some plants might very well be adapted for collecting the rain water, believed that they had a perception of this use in that of the *dipsacus*, or fullers-thistle. It was very easy to fall into a mistake here, for the leaves are opposite, and meet at their bases; so that after it has rained, they present reservoirs, which contain, one with another, a good half-glass of water, and which are disposed in stories along it's stem. But they ought to have considered, first, that the *dipsacus* grows naturally on the brink of waters, and that Nature does not bestow cisterns of water on aquatic plants. This would be, according to the proverb, to carry water to the river. Secondly, they might have observed, that the tiers formed by the opposite leaves of the *dipsacus*, so far from being reservoirs, are, on the contrary, dischargers, which convey off the rain water from it's roots, to the distance of nine or ten inches, on every side, by the extremities of it's leaves. They resemble, in some respects, the gutters which project from the roofs of our houses, or those which are formed by the corners of our hats, which serve to carry away the rain water from the body, and not to throw it inward. Besides, the water which

remains in the cavity of the leaves of the *dipsacus* never can get down to the root of the plant, for it is detained there, as at the bottom of a vase. It would not even be proper for moistening it, for *Pliny* insists that it is brackish. The birch-wort, which grows in the trembling and frothy marshes of Canada, carries, at it's base, two leaves, formed like the halves of a trumpet sawed asunder lengthwise. They are both concave, but have, at the extremity that is farthest from the plant, a kind of bill, shaped like a spout. The water which remains in the receivers of these aquatic plants, is, perhaps, destined to supply drink to the small birds, which sometimes find themselves not a little embarrassed how to come at it, in the time of inundations.

It is necessary carefully to make a distinction between the elementary, and the relative, characters of plants. Nature obliges the man who studies her, not to hold to external appearances, and, in order to form his understanding, she makes him rise from the means which she employs, to the ends which she proposes. If certain aquatic plants seem to present, in their foliage, some of the characters of mountaineers, there are upon the mountains, some which seem to present characters similar to those of the waters; such, for example, is the broom. It bears leaves so small, and so few in

in number, that they appear insufficient for collecting the water necessary to it's growth, and so much the more, that it thrives in soils the most parched. Nature has indemnified it in another manner. If it's leaves are small, it's roots are very long. They go in quest of coolness to a great distance. I have seen some of them extracted from the earth, which were more than twenty feet in length, and it was necessary, after all, to break them off, it being impossible to reach the extremities. This prevents not the scanty leaves from exhibiting the mountain-character; for they are concave, they point toward Heaven, and are lengthened out, like the under bill of a bird.

The greatest part of aquatic vegetables throw the water off from them, some by their port; such as the birch, the branches of which, so far from rearing themselves toward Heaven, fall downward, in form of an arch. The same thing may be affirmed of the great chestnut and of the walnut, unless these trees should have changed their natural attitude, by growing in thirsty situations. Their bark is usually sleek, as that of the birch, or scaly, like that of the chestnut; but not hollowed into canals, as that of the elm, or the mountain pine. Others have in themselves a repulsive quality: such are the leaves of the nymphæa, and of several species of colewort, on which the drops of water col-

lect into globules, like the particles of quicksilver. Nay, there are some which it is extremely difficult to moisten, such as the stems of many species of capillary plants. The laurel, we are told, carries it's repulsive quality to such a degree, as to repel the thunder. If this quality, so highly extolled by the Ancients, is really possessed by the laurel, we must, undoubtedly, ascribe this to it's nature as a fluviatric plant. The laurel grows in abundance on the banks of the rivers of Theffaly. A traveller, whose name is the *Sieur de la Guilletière* *, says, in a relation written in a very lively and agreeable manner, that he never saw any where such fine laurels as along the side of the river Peneus. Hence, perhaps, was suggested the idea of the metamorphosis of *Daphne*, the daughter of that river-deity, transformed by *Apollo* into a laurel.

This repulsive property of certain trees, and of some aquatic plants, induces me to think that they might be employed around our habitations, as a security against thunder-storms, and that in a manner more certain, and much more agreeable, than electrical conductors, which dissipate, only by attracting them to the neighbourhood. They might farther be very advantageously employed for drying

* See the Voyage to Lacedemon, by the *Sieur de la Guilletière*.

marshy grounds ; as the attractive qualities of many mountain-vegetables, might be used in forming fountains upon heights, by collecting there the vapours which float in the air. There is not, perhaps, an infectious morass on the Globe, except in places where men have injudiciously destroyed the plants whose roots absorbed the humidity of the Earth, and whose foliage repelled that of the Heavens.

I pretend not to affirm, however, that the foliage of aquatic plants has no farther uses : for where is the man who has entered into the endless views of Nature ? “ To whom hath the root of wisdom been revealed ? or who hath known her wise counsels ? ” *Radix sapientiæ cui revelata est ? et astutias illius quis agnovit ?* * In general, the leaves of aquatic plants appear, from their extreme mobility, very much adapted to the purpose of renewing the air of humid places, and of producing, by their movements, that drying of the ground to which I have just alluded. Such are those of reeds, of poplars, of aspens, of birches, and even of willows, which are sometimes in motion, though there is not the slightest degree of wind perceptible.

* Ecclesiasticus, chap. i. ver. 6.

It is farther remarkable, that most of these vegetables emit a very pleasing smell; among others, the poplar and the birch, especially in the Spring; and that a great number of aromatic plants thrive by the water's-side, as mint, sweet marjoram, ciperus, the sweet-smelling-rush, the iris, the *calamus aromaticus*: and, in the Indies, the spice-plants, such as the cinnamon-tree, the nutmeg, and the clove. Their perfumes must contribute very powerfully to diminish the mephitic exhalations, which are natural to marshy and humid places. They have, likewise, many uses relatively to animals, such as affording a shade to the fishes which resort thither, in quest of a shelter from the scorching heat of the Sun.

But one conclusion we may certainly deduce, in favour of our improvements in culture, from the observations now made; namely this, that in the cultivation of plants, the pedicle of whose leaves presents no impress of a canal, it is necessary to water them copiously; for, in this case, they are naturally aquatic. The nasturtium, the mint, and the sweet-marjoram, consume a prodigious quantity. But when plants are provided with a canal, they must be watered more sparingly, for this demonstrates them to be originally natives of the mountains. The deeper this canal is, the less

less artificial watering do they require. Every gardener knows, that if you frequently water the aloës, or the taper of Peru, you will kill them.

The seeds of aquatic plants have forms not less adapted, than those of their leaves, to the places where they are destined to grow; they are all constructed in a manner the most proper for sailing off. Some of them are fashioned into the figure of shells, others into boats, rafts, skiffs, single and double canoes, similar to those of the South-Seas. I can have no doubt, that, by an attentive study of this part alone, a great number of very curious discoveries might be made, respecting the art of crossing currents of every sort; and I am persuaded that the first men, who were much better observers than we are, copied their different methods of travelling, by water, after those models of Nature, of which we, with all our pretensions to discovery, are but feeble imitators.

The aquatic, or maritime pine, has it's kernels inclosed in a kind of little bony shoes, notched on the under side, and covered over, on the upper, with a piece resembling a ship's hatch. The walnut, which delights so much in the banks of rivers, has it's fruit contained in two little boats, whose apertures are perfectly fitted to each other. The hazel, which becomes so bushy on the brink
of

of rivulets; the olive, which is enamoured of the sea-shore to such a degree, that it degenerates in proportion as you remove it thence, carry their seed inclosed in a species of little casks, capable of holding out the longest voyages. The red berry of the yew, whose favourite residence is the cold and humid mountain, by the side of a lake, is hollowed into a little bell. This berry, on dropping from the tree, is, at first, carried down, by it's fall, to the bottom of the water: but it returns instantly to the surface, by means of a hole, which Nature has contrived, in form of a navel, above the seed. In this aperture is lodged a bubble of air, which brings it back to the surface of the water, by a mechanism more ingenious than that of the divers-bell, in this, that the vacuum of the diving bell is undermost, and in the berry of the yew it is uppermost.

The forms of the seeds of aquatic-plants are still more curious; for, universally, Nature redoubles her skill and exertions in favour of the little and the weak. That of the bulrush resembles a lobster's eggs; that of fennel is a real canoe in miniature, hollowed in the middle, with both ends raised into a prow. There are others grooved into each other, resembling pieces of wood disposed for a float, and worm-eaten; such are those of the horned poppy. Those which are destined

to thrive on the brink of waters destitute of current, are wafted by sails; such is the seed of a scabious plant of our own country, which grows on the border of morasses. Besides, the difference of this from the other species of scabious, whose seeds are crowned with pronged hairs, in order to fasten themselves on the hairs of the animals which transplant them, the one, last-mentioned, is overtopped by a half-bladder open, and resting on it's summit like a gondola. This half-bladder serves it, at once, as a sail by water, and as a vehicle by land. These means of natation, though endlessly varied, are common, in all climates, to the grains of aquatic plants.

The almond of the river of the Amazons, known by the name of *totoca*, is inclosed in two shells, exactly similar to those of an oyfter. Another fruit on the strand of the same river, which abounds in almond-trees, has a perfect resemblance, in colour and form, to an earthen pot, with it's little lid*; it goes by the name of the monkey's porridge-pot. Others are formed into large bottles, as the fruit of the great gourd. There are seeds incrufted in a coat of wax, which makes them float, such are the berries of the wax-tree, or royal

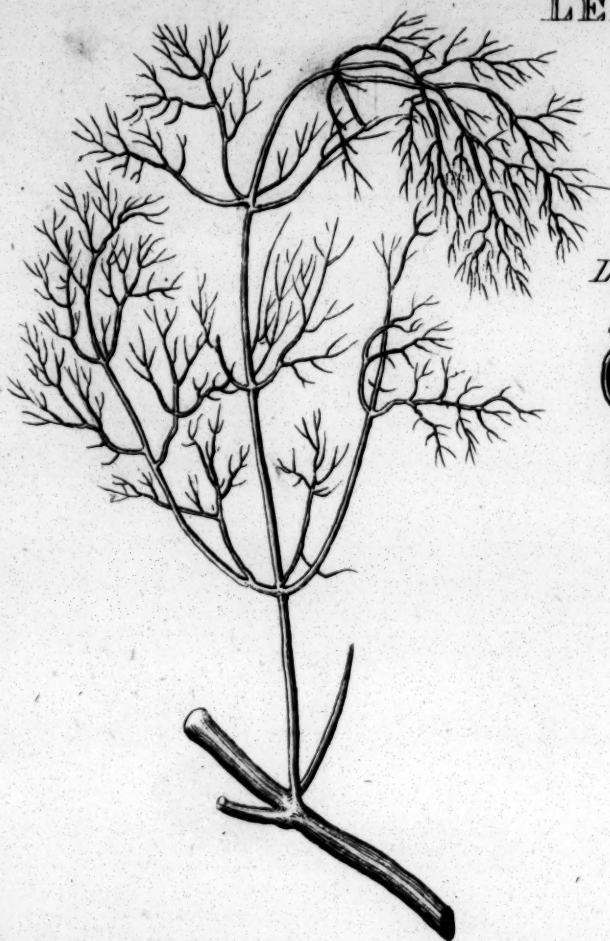
* See engravings of most of those seeds, in *John de Laet's History of the West-Indies*.

pimenta of the shores of Louisiana. The formidable apple of the mancenilla, which grows on the sea-shore of the islands situated between the Tropics, and the fruit of the manglier, which grows there actually in the salt-water, are almost ligneous. There are others with shells similar to the sea-urchin, without prickles. Many are coupled, and perform their voyage like the double canoe, or balse, of the South-Sea. Such is the double cocoa of the Sechelles-Islands.

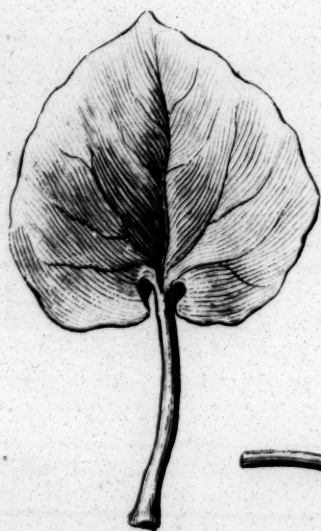
If you examine the leaves, the stems, the attitudes, and the seeds of aquatic plants, you will always remark in them characters relative to the places where they are destined to grow, and in harmony with each other; so that, if the seed has a nautical form, it's leaves are deprived of an aqueduct; just as in mountain-plants, if the grain is volatile, the pedicle of the leaf, or the leaf altogether, presents a channel.

I shall assume, as an instance of the nautical harmonies of plants, the nasturtium, with which every one is acquainted. This plant, which bears flowers so agreeable, is one of the cresses of the rivulets of Peru. It must be observed, first, that the foot-stalks of it's leaves have no conduit, like those of all aquatic plants; they are inserted in the middle of the leaf, which they support like an umbrella,

LEAVES WITHOUT AN AQUEDUCT
FRUITS OF VEGETABLES



*Leaf & Seeds
of Fennel*



*Leaf & Fruit of the Martinia
of the shores of la Vera Cruz.*



*Fruit of the Martinia
part of its habit*

AN AQUEDUCT, & NAUTICAL
VEGETABLES OF THE SHORE.

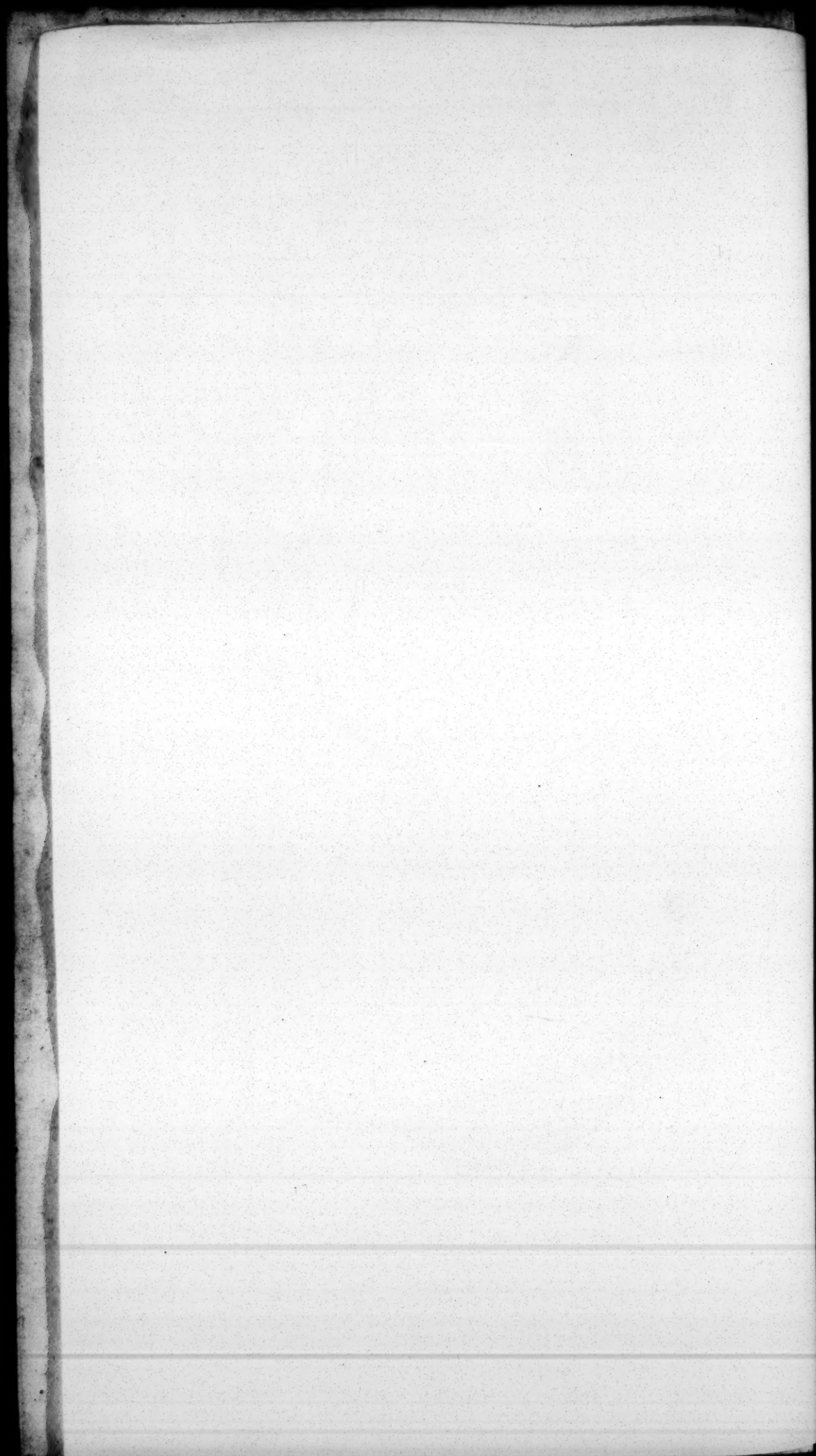


*Leaf & Fruit
of the Walnuttree.*

*of the Martinia with
t of its husk.*



*Leaf &
Seeds of the
Nasturtium.*



umbrella, to ward off from them the water which falls from Heaven. Its seed, when fresh, has exactly the form of a boat. The upper part is raised into a slope, like a bridge to let the water run off; and you distinguish perfectly, in the lower part, a poop and a prow, a keel and a bottom. (*See the annexed Plate.*) The little furrows of the seed of the nasturtium are characters common to most nautical grains, as well as the triangular forms, and those of the kidney or keel. Those furrows, undoubtedly, prevent them from rolling about in all directions, constrain them to float along lengthwise, and give them the direction the best adapted to the track of the water, and to the passage of the narrowest straits. But they have a character still more general; it is this, that they swim in their state of maturity, which is not the case with grains destined to grow in the plains, such as pease and lentils, which sink to the bottom.

Some species of these, nevertheless, such as the french-bean, sink, at first, to the bottom, and rise to the surface when penetrated with the water. Others, on the contrary, float at first, and sink afterward. Such is the Egyptian bean, or the seed of the colocasia, which grows in the waters of the Nile. In order to sow it, you are under the necessity of rolling it up in a ball of earth; and in that state it is thrown into the water. Without this precaution,

precaution, not one would remain on the shores where you would wish it to grow. The natality of aquatic seeds is, undoubtedly, proportioned to the length of the voyages which they have to perform, and to the different gravity of the waters in which they are destined to swim. There are some which float in sea-water, and sink in fresh, which is lighter than sea-water by one thirty-second part: such precision is in the balancing of Nature! I believe that the fruit of the great India chestnut, which thrives on the shores of the salt creeks of Virginia are in this situation. In a word, I am so entirely convinced of all the relations which Nature has established among her Works, as to conclude, that the time when the seeds of aquatic plants drop, is regulated, in most cases, by that of the overflowing of the rivers where they grow.

It is a speculation well worthy of the attention of the philosophic mind, to trace those vegetable fleets sailing along, night and day, with the current of the rivulets, and arriving, undirected by any pilot, on unknown regions. There are some which, by the overflowing of the waters, now and then lose themselves in the plains. I have seen them, sometimes, accumulated upon each other, in the bed of torrents, presenting around the pebbles where they had germinated, waves of verdure of the most beautiful sea-green. You would have
thought

thought that *Flora*, pursued by some River-god, had dropped her basket in the urn of that deity. Others, more fortunate, issuing from the sources of some stream, are caught by the current of the greater rivers, and conveyed away to embellish their distant banks with a verdure not their own.

There are some which cross the vast Ocean; and, after a long navigation, are driven, by the very tempests, on the regions which they adorn and enrich. Such are the double cocoas of the Sechelles, or Mahé Islands, which the Sea carries regularly every year a distance of four hundred leagues, and lands them on the coast of Malabar. The Indians, who inhabit it, were long under the persuasion, that those annual presents of the Ocean must have been the produce of a palm-tree that grew under it's billows. They gave them the name of marine cocoa-nuts; and ascribed wonderful virtues to them. They set as high a value upon them as upon ambergris; and to such a pitch was this extravagance carried, that many of those fruits have been sold as high as a thousand crowns a piece. But the French having, some years ago, discovered the Island of Mahé, which produces them, and which is situated in the fiftieth degree of South-Latitude, imported them in such quantities to India, that they sunk at once in value and in reputation; for men, in every coun-

try, prize those things only which are rare and mysterious.

In every island where the eye of the traveller has been able to contemplate the primordial dispositions of Nature, he has found their shores covered with vegetables, all the fruits of which possess nautical characters. *James Cartier* and *Champlain* represent the strands of the lakes of North-America as shaded by stately walnut-trees. *Homer*, who has so attentively studied Nature, at times, and in places, where she still retained her virgin beauty, has planted the wild-olive along the shores of the island on which *Ulysses*, floating upon a raft, is thrown by the tempest. The navigators who have made the first discoveries in the seas of the East-Indies, frequently found in them shallows planted with cocoa trees. The Sea throws such quantities of fennel-seed on the shores of Madeira, that one of it's bays has obtained the name of Funchal, or Fennel-Bay.

It was by the course of those nautical seeds, too carelessly observed by modern Seamen, that the Savages formerly discovered the islands to windward of the countries which they inhabited. They formed conjectures respecting a tree at a great distance, on seeing it's fruit cast upon their shores. By similar indications, *Christopher Columbus* acquired

acquired the assurance, that another world existed. But the regular winds and currents from the East, in the South-Sea, had carried them long before to the Nations of Asia; of which I shall say something toward the end of this Study.

There are, besides, vegetables of an amphibious nature. They are disposed in such a manner, that one part of their foliage raises itself toward Heaven, and the other forms an arcade, and bends downward to the ground. Nature has given to their seeds, likewise, the power of at once flying and swimming. Such is the willow, the seed of which is enveloped in a cobweb down, which the winds transport to a great distance, and which floats along the surface of the water, without wetting itself, like the downy feathers of the duck. This down is composed of small capsules, like the bottom of a lamp, and with two beaks, filled with seeds, which are crowned with a plume: so that the wind conveys those capsules through the air, and likewise transports them, by sailing, along the face of the water. This configuration was admirably adapted, to be the vehicles of the seeds of plants which grow by the side of stagnant waters and lakes. The same thing holds as to the seeds of the poplar; but those of the alder, which grows on the banks of rivers, have no plumage, because

the current of the stream is designed to convey them from place to place.

The seeds of the fir, and of the birch, have, at once, volatile and nautical characters; for the fir has it's kernel attached to a membranous wing; and the birch has it's grain embraced by two wings, which give it the appearance of a little shell. These trees grow, at once, on the wintry mountains, and on the margin of the lakes of the North; their seeds had occasion not only to sail over stagnant waters, but to be transported through the air over the snows, in the midst of which they take delight. I have no doubt that there may be species of these trees, the seeds of which are altogether nautical. Those of the linden-tree are carried in a spherical body, similar to a little bullet. This bullet is affixed to a long tail, from the extremity of which descends obliquely a follicle of considerable length, whereby the wind carries it away to a great distance, spinning it round and round. When it drops into the water, it plunges about the length of an inch in it, and serves, in some sort, as ballast to it's tail, and to the little leaf attached to it, which thus, being brought to a vertical situation, perform the functions of a mast and a sail. But the examination of so many curious varieties would carry me too far.

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This would be the proper place to speak of the roots of vegetables; but I am little acquainted with what passes under ground. Besides, in all Latitudes, on heights, as well as by the water's-side, we find the same substances nearly, muds, sands, pure mould, rock, which must produce a much greater resemblance in the roots of plants than in the other parts of their vegetation. I have no doubt, however, that Nature has established, on this subject, relations, the knowledge of which would be highly useful, and that a cultivator, somewhat experienced, might be able, by inspecting the root of a vegetable, to determine the species of soil best adapted to it. Those which are very hairy seem most proper for sandy grounds. The cocoa-tree, which grows to a very large size on the shores of the Torrid Zone, thrives in pure sand, which it interlaces with such a prodigious quantity of hairy fibres, as to form a solid mass around it. It is on this basis that it effectually resists the most violent tempests, in the midst of a moving soil. What is singularly remarkable in the case of this plant, it never succeeds so well as in the sand on the sea-shore, and generally languishes in the interior of a country.

The Maldivia Islands, which are, for the most part, nothing but sandy shallows, are the most renowned regions of all Asia, for the abundance and

the beauty of their cocoa-trees. There are other vegetables of the shores, the roots of which are drawn out like cords. This configuration renders them exceedingly proper for binding together the ground, and thereby defending it against the inroads of the watery element. Such are, among ourselves, the alder, the reed, but, above all, a species of dogs-grass, which I have seen very carefully cultivated in Holland along the dikes.

Bulbous plants appear, in like manner, to take pleasure in soft muds, into which they cannot penetrate very far, from the roundness of their bulbs. But the elm extends its roots at pleasure on the declivity of the mountain; and the oak inserts his sturdy pivots into it, to lay hold of the successive strata of which it is composed. Other plants preserve, on the high grounds, by their creeping foliage and their superficial roots, the emanations of dust which the winds there deposit. Such is the *anemone nemorosa*. If you find a single foot of it on a hill, in a wood not greatly frequented, you may rest assured, that it diffuses itself like a network through the whole extent of that wood.

There are trees, the trunks and the roots of which are admirably contrasted with obstacles which appear to us accidental, but which provident Nature foresaw. For example, the cypress
of

of Louisiana grows with it's foot in the water, chiefly on the banks of the Méchassipi, whose vast shores it magnificently shades. It rises there to a height which surpasses that of almost any of the trees of Europe *. Nature has given to the trunk of this stately tree, a circumference of more than thirty feet, in order to enable it to resist the ices from the lakes of the North, which discharge themselves into that river, and the prodigious rafts of timber which float down it's stream, and which have obstructed most of it's mouths to such a degree, as to interrupt the navigation to vessels of any considerable burthen. And, to put it beyond a doubt, that she designed the thickness of it's trunk for withstanding the shock of floating bodies, it is remarkable, that, at the height of six feet, she suddenly diminishes the size of it at least a third, the full magnitude having become superfluous at that degree of elevation : and for the purpose of securing it in another manner, still more advantageous, she raises out of the root of the tree at four or five feet distance all around, several large stumps from one foot to four feet high. These are not shoots ; for their head is smooth, and bears neither leaves nor branches : they are real ice-breakers.

* See Father *Charlevoix*, his History of New France, vol. iv.

The tupelo, another great tree of Carolina, which grows likewise by the water's side, but in creeks, has nearly the same dimensions at it's base, excepting the ice-breakers, or pallisades. The seeds of those trees are fluted, as I have already observed to be the case with aquatic seeds in general; and that of the cypress of Louisiana differs considerably, by it's nautical form, from that of the cypress of the mountains of Europe, which is volatile. These observations are so much the more worthy of credit, that Father *Charlevoix*, who, in part, relates them, deduces no consequence whatever from the facts, though he was abundantly capable of interpreting their use.

It must now be apparent of what importance it is to connect the study of plants with that of the other Works of Nature. It is possible to ascertain, by their flowers, the exposure to the Sun which is best adapted to them: by their leaves, the quantity of water that is necessary to them; by their roots, the soil which is most suitable; and by their fruits, the situations in which they ought to be placed, together with new relations to the animals which feed upon them. By fruit I mean, as Botanists likewise do, seed of every species.

The fruit is the principal character of the plant. Of this we may form a judgment, first, from the
care

care which Nature has bestowed on it's formation and preservation. It is the ultimate term of her productions. If you examine, in a vegetable, the different envelopes which inclose it's leaves, it's flowers, and it's fruits, you will perceive a most wonderful progression of pains and precautions. The simple leaf-buds are easily distinguishable from the simplicity of their cases. Nay, there are plants which have none at all, as the shoots of the gramineous, which start immediately out of the earth, and stand in no need of any foreign protection. But the buds which contain flowers are provided with sheaths, or lined with down, as those of the apple-tree; or cased over with glue externally, as those of the great India chestnut; or are inclosed in bags, as the flowers of the narcissus; or secured in some way or another, so as to be very distinguishable, even before their expansion.

You afterwards perceive, that the care employed in dressing out the flower, was entirely destined to the fecundation of the fruit; and that when this is once formed, Nature redoubles her precautions, both externally and internally, for it's preservation. She gives it a placenta, she envelops it in pellicles, in shells, in pulps, in pods, in capsules, in husks, in skins, and sometimes in a case of thorns. A mother cannot pay more attention to the cradle of her infant. In process of time, in
order

order that her grown child may be enabled to go abroad, and look for a settlement in the world, she crowns it with a tuft of plumage, or incloses it in a shell : furnishes it with wings to fly away through the air, or with a bark to sail off along the face of the water.

There is something still more marked, to arrest our observation, in favour of the fruit. It is this, that Nature frequently varies the leaves, the flowers, the stems, and the roots of a plant ; but the fruit remains constantly the same, if not as to it's form, at least as to it's essential substance. I am persuaded that, when she was pleased to create a fruit, it was her intention that it should have the power of re-producing itself on the mountains, in the plains, amidst rocks, in sands, on the brink of waters, and under different Latitudes ; and, in order to adapt it to it's situation, she varied the watering-pot, the mirror, the prop, the attitude, the buttress, and the fur of the vegetable, correspondingly to the Sun, to the rains, to the winds, and to the soil. To this intention, I believe, we ought to ascribe the prodigious variety of species in every genus, and the degree of beauty which each attains, when in the situation that is natural to it. Thus, in forming the chestnut to reach perfection on the stony mountains of the South of Europe, and to supply the want of corn, which
scarcely

scarcely succeeds there, she placed it on a tree which in those regions attains magnificence from it's adaptations.

I have eaten of the fruit of the chestnut-tree of the Island of Corfica. It is as large as small hen's eggs, and makes excellent food. You may read, in a modern traveller, the description of a chestnut-tree, which grew in Sicily, on one of the ridges of Mount *Ætna*. It's foliage is of such extent, that a hundred cavaliers could repose with ease under it's shade. For that reason it obtained the name of *centum cavallo*. Father *Kircher* assures us, that he had seen, on the same mountain, in a place called *Trecaftagne*, three chestnut trees of such a prodigious size, that when they were felled, you might have lodged a large flock of sheep under covert of their bark. The shepherds employed them for this purpose, in the night-time, and in bad weather, instead of penning up their charge in the fold. Nature has granted, to this stately vegetable, the faculty of collecting, on the steep mountains, the waters of the Atmosphere, by means of leaves formed like so many tongues; and of penetrating, by means of it's sturdy roots, down to the very bed of fountains in despite of lavas and rocks.

Nature

Nature has been pleased, elsewhere, to produce the fruit of this tree with a degree of bitterness, for the use of some animal no doubt, on the brink of the salt-water creeks, and arms of the Sea, in Virginia. She has bestowed on the tree which bears it, leaves disposed in form of a tile, a scaly bark, flowers different from those of the European chestnut-tree, but adapted, unquestionably, to the humid exhalations, and to the aspects of the Sun to which it is exposed. In a word, she has transformed it into the great India chestnut. It arrives at much greater beauty in it's native country, than in Europe. That of America is the maritime chestnut-tree; and that of Europe is the chestnut-tree of the mountains. She has placed, perhaps by a different kind of combination, this fruit, on the beech-tree of our hills, the mast of which is evidently a species of chestnut.

Finally, by means of one of those maternal attentions which have induced her to suspend, even on herbs, the productions of trees, and to serve up the same dishes on the smallest tables, she has placed before us the same fruit in the grain of the black corn, which, in it's colour, and it's triangular form, resembles the seed of the beech, called in Latin *fagus*, whence this species of corn has obtained the name of *fagopyrum*. One thing, at
any

any rate, is certain, namely, that independent of the mealy substance, we find, in the black-corn, in the beech-mast, and in the chestnut, similar properties, such as that of cooling excessive heat of urine *.

It was, in like manner, the intention of Nature to produce the acorn, in a great variety of exposures. *Pliny* enumerated, in his time, thirteen different species in Europe, one of them, which makes very excellent food, is that of the green oak. It is of this that the Poets speak, when they celebrate the felicity of the Golden Age, because it's fruit then served as an aliment to Man. It is worthy of being remarked, that there is not a single genus of vegetable, but what gives in some one of it's species, a substance capable of being converted into nourishment for mankind. The acorn of the green oak is, among the fruits of this genus of trees, the portion reserved for our use. Nature has been pleased, after making this provision for Man, to scatter the other species of the oak over the different soils of America, to supply the necessities of her other creatures. She has preserved the fruit, and has varied the other parts of the vegetable. She has placed the acorn, but with the leaves of the willow, on the plant which has,

* See *Chomel's* Treatise on Common Plants.

for that reason, got the name of the willow-leaved oak, and which thrives in that country by the water's-side *. She has placed it, together with small and pendent leaves affixed to pliant tails, like those of the aspin, on the water-oak, which grows there in the marshes. But when she intended to plant them in dry and parched soils, she united to them leaves of ten inches in breadth, adapted to the reception of rain-water, such are those of the species known by the name of the black oak in that country.

It may be necessary farther to observe, that the place where any species of plant produces the finest fruit, determines it's principal genus. Accordingly, though the oak has it's species scattered about every where, it must be considered as of the genus of mountain-trees; because that which grows on the mountains of America, and there distinguished by the name of the chestnut-leaved oak, yields the largest acorns, and is one of the greatest trees in that part of the world; whereas the water-oak, and the willow-leaved oak, rise to no great height, and produce very small acorns.

The fruit, as we have seen, is the invariable character of the plant. To it, accordingly, Na-

* See the figures of it in Father *Charlevoix*, his *History of New France*, vol. iv.

ture has likewise attached the principal relations of the animal kingdom to the vegetable kingdom. It was her intention that an animal of the mountains should find the fruit, on which he has been accustomed to live, in the plains, on the sand, among the rocks, when he is under the necessity of changing his country, and especially on the brink of rivers, when he descends thither to quench his thirst. I am not acquainted with a single mountain-plant but what has some of its species, with their corresponding varieties, scattered over all situations, but principally on the margin of waters.

The mountain-pine has its kernels mounted on wings, and the aquatic pine has its seed inclosed in a skiff. The seeds of the thistle, which grows on a parched soil, are furnished with plumes, to convey them from place to place: those of the fullers-thistle, which thrives by the water's side, have none, because they had no occasion for any to assist them in swimming. Their flowers vary for similar reasons; and though Botanists have made two different genera of them, the goldfinch fails not to acknowledge this last as a real thistle. He rests himself upon it, when he finds it convenient to go and cool himself on some watery bank. He forgets, on beholding his favourite plant, the sandy downs where he was born,

born, and cheers the banks of the rivulet, with the music of his song, and the beauty of his plumage.

It appears to me impossible to acquire any thing like a knowledge of plants, unless by studying their geography, and their ephemeris. Without this double illumination, which mutually reflects, their forms will be for ever strange to us. The greatest part of Botanists, however, pay no manner of regard to this. In making their collections, they remark not the season at which plants grow, nor the place where, nor the aspect to which they are exposed. They carefully attend to all their intrinsic parts, and especially to their flowers; and after this mechanical examination, deposit them in their herbary, and imagine they have a thorough knowledge of them, especially if they have had the good fortune to dignify them, by imposing some Greek name. They resemble a certain huffar, of whom I have heard, who having happened to find a Latin inscription in brazen characters, on an antique monument, disengaged them one after another, and tumbled them together into a basket, which he dispatched to an Antiquarian of his friends, with a request that he would inform him what they meant. They no more lead us to an acquaintance with Nature, than a Grammarian would give us a relish for the
genius

genius of *Sophocles*, by presenting us with a naked catalogue of his tragedies, of the division of their acts and scenes, and of the number of verses which compose them. With equal absurdity are they chargeable who collect plants, without marking their relations to each other, and to the elements; they scrupulously preserve the letter, but suppress the sense of it. Far different was the manner in which a *Tournefort*, a *Vaillant*, a *Linnaeus*, prosecuted the study of Botany. If these learned men have not deduced any consequence from those relations, they have, at least, prepared the projecting stones of expectation, which promise the construction of a future fabric of science.

Though the observations which I have just made, respecting the elementary harmonies of plants, are but few in number, I have the confidence to affirm, that they are of very high importance to the progress of agriculture. The point in question is not to determine geometrically the genera of flowers, whose mirrors are the best adapted for reflecting the rays of the Sun in every point of Latitude; the glory of calculating their curves is reserved for future *Newtons*. Nature has outrun our most ardent wishes, in those places where she has been left at liberty to re-establish her own plans. We have it in our power to secure prosperity to ours, in a manner the most be-

neficial, by reducing them into harmony with her's. In order to ascertain what plants are best adapted to succeed in such and such a district, you have only to pay attention to the wild plants which thrive there spontaneously, and which are distinguishable for their vigor and for their multitude: then substitute in their place domestic plants, which have the same kind of flowers and leaves. Wherever umbelliferous plants grow, you may put in their room such of our culinary vegetables as have most analogy with them, from their leaves, their flowers, their roots, and their grains, such as the daucus genus: the arthichoke will there usefully replace the gaudy thistle; the domestic plumb-tree ingrafted on a wild stock of the same plant, in the very place where this last spontaneously sprung up, will become extremely vigorous. I am persuaded that by these natural approximations, advantage might be derived from the most barren sands and rocks; for there is not a single genus of wild plants but what contains a species fit for food.

But it was not sufficient for Nature to have established so many harmonies between plants, and the situations in which they were destined to vegetate, had she not likewise provided means for restoring them, when destroyed by the intolerant culture of Man. Let a piece of ground be left uncultivated,

uncultivated, for ever so short a space of time, and you will presently see it clothed with vegetables. They grow there in such numbers, and so vigorously, that there is no husbandman capable of producing an equal quantity, on the same spot, let him take what pains he will. These shoots, however, so vigorous and so rapid, which frequently take possession of our dock-yards of free-stone, of our walls of ashlar, and of our courts paved with granite, are, in many cases, only a provisional culture. Nature, who is always advancing from harmony to harmony, till she has attained that point of perfection which she proposed to herself, sows, at first, with grasses, and herbage of different species, all abandoned soils, waiting for an opportunity of exerting her powers, to raise on that very spot vegetables of a higher order. On the rude neglected districts, where barren downs alone meet our eyes, posterity may behold stately forests arise.

We shall throw, as our custom is, a superficial glance on the very ingenious methods which Nature employs for preparing and conducting those vegetable progressions. We shall hence attain a glimpse, at least, not only of the elementary relations of plants, but of those which exist between their different classes, and which extend even to

the animal kingdom. Vegetables which are the most contemptible in the eyes of Man, are frequently the most necessary in the order of Creation.

The principal means employed by Nature for securing the growth of plants of every species, are the thorny plants. It is very remarkable, that plants of this description are the first which appear on lands in fallow, or in forests which have been cut down. They are, in truth, wonderfully well adapted to promote foreign vegetations, because their leaves with deep incisions, like those of the thistle and echium, or their sprigs bent into an arch, as those of the bramble, or their horizontal and interlaced branches, like those of the black-thorn, or their boughs bristled with briars and unprovided with leaves, as those of the sea-rush, leave underneath and around them many intervals through which other vegetables may arise, and find protection from the tooth of most quadrupeds. Nurseries of trees are frequently to be found in their bosom. Nothing is more common in coppice-woods than to see a young oak start out of a tuft of brambles, which enamels the earth all around, with it's clusters of prickly flowers; or a young pine arise out of a yellow brake of marine-rushes.

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When these trees have once acquired a certain degree of growth and size, they stifle, by their shade, those thorny plants, which subsist no longer, except along the skirts of the woods, where they enjoy air sufficient for their vegetation. But in this situation, such plants are still going on to extend the empire of their superiors, from year to year, over the plains. Thus, the thorny plants are the original cradles of the forests; and the scourge of the agriculture of Man, is the bulwark of that of Nature.

Man has, however, imitated, in this respect, the processes of Nature; for if he wishes to protect the newly sown seeds of his garden, he finds it frequently necessary to cover them with prickly branches of one sort or another. It appears to me probable, that there is not a heath but what, in time, might become a forest, were their commoners restrained from driving their flocks thither to pasture, for the cattle crop the tender shoots of the trees as fast as they spring up. This, in my opinion, is the reason why the declivities of the lofty mountains of Spain, of Persia, and of many other parts of the World, are not clothed with trees: it is because of the numerous flocks of sheep which are driven thither, in Summer, and which roam over their different chains. I am fully convinced that those mountains were covered, in

the earlier ages of the World, with forests which were laid low by their first inhabitants; and that they would resume their ancient clothing, though now naked and desert, were the cattle to pasture on them no longer. It is very remarkable, that those elevated regions are sowed over with prickly plants, just as our heaths generally are.

Don *Garcias de Figueroa*, Ambassador from Spain at the Court of *Cha-Abas*, King of Persia, relates, in the account which he has given of his journey, that the lofty mountains of Persia, which he crossed, and where the Turcomans are continually straying, as they tend their fleecy charge, were covered with a species of thorny shrub, which grew luxuriantly in the most parched situations. This same shrubbery served as a retreat to a great number of partridges.

From this circumstance we take occasion to observe, that Nature employs the birds, particularly, to sow the thorny plants in places the steepest and most inaccessible. They are accustomed to retire thither in the night, and there deposit, with their dung, the stony seeds of the bramble-berry, of the berry of the eglantine, of the barberry, and of most thorny shrubs, which, from relations no less wonderful, are indigestible in their stomach.

Birds have, besides, particular harmonies with those vegetables, as we shall make appear in it's proper place. Not only do they find on them a plentiful supply of food, and shelter under them, but downs for lining their nests, as on thistles, and on the cotton-tree of America; so that if many of them resort for safety to the elevation of towering trees, others find it in the thorny brake. There is not a single bush but what has it's peculiar bird.

Independantly of the plants proper to each situation, and which are there domesticated, there are some in a state of incessant peregrination, and flit round the earth, without settling in any fixed abode. We can easily have a conception of the cause of this constant removal, by supposing, what is actually the truth, that several of such plants shed their seeds only at the season when certain regular winds blow, or at certain revolutions of the currents of the Ocean. Whatever may be in this, I am of opinion that we must rank, under this description, many plants which were known to the Ancients, but are not now to be found. Such, among others, is the celebrated *lazerpitium* of the Romans, the juice of which, called *lazer*, sold for it's weight in silver. This plant, according to *Pliny*, grew in the vicinity of the city of Corenum, in Africa; but had become such a rarity in his

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time as hardly any where to be seen. He tells us that a single plant of it had been found, under the reign of *Nero*, and that it was sent to this Prince as a great curiosity.

Modern Botanists pretend, that the lazerpitium is the same plant with the *silphium* of our gardens. But they are evidently in an error, from the descriptions which the Ancients, and, among others, *Pliny* and *Dioscorides* have left us of it. For my own part, I have no doubt that the lazerpitium is of the number of the vegetables which are destined to flit along the Earth, from East to West, and from West to East. It is, perhaps, at present, on the western shores of Africa, whither the easterly winds may have conveyed it's seeds; perhaps, likewise, by the revolutions of the westerly winds, it may have returned to the place where it was in the days of *Augustus*; or it may have been conveyed into the plains of Ethiopia, among Nations totally unacquainted with it's pretended wonderful qualities.

Pliny enumerates a great many other vegetables, which are, at this day, to us equally unknown. It may merit observation, that those vegetable apparitions have been contemporary with several species of flitting birds, which have likewise disappeared. It is well known that there are several classes of
birds,

birds, and of fishes, which do nothing but migrate incessantly over the Earth and through the Seas; some, in a certain revolution of days; others, at the end of a certain period of years. Many plants may be subjected to a similar destiny. This Law extends even to the Heavens, in which some new star is, from time to time, making it's appearance. Nature, as I think, has disposed her Works in such a manner, as to have always some novelty in reserve, in order to keep Man continually in exercise. She has established, in the duration of the existence of the different beings of each kingdom, concerts of a moment, of an hour, of a day, of a moon, of a year, of the life of a man, of the duration of a cedar, and, perhaps, of that of a globe: but this, undoubtedly, is known to the SUPREME BEING alone.

I am persuaded, at the same time, that the greatest part of flitting plants must have a principal centre, such as a steep rock, or an island in the midst of the Sea, from whence they diffuse themselves over all the rest of the world. This leads me to deduce, what I consider as an irrefragable argument in support of the recent Creation of our Globe; it is this, were the Globe of very remote antiquity, all the possible combinations of the propagation of plants by seed, would have been already completed all over the World. Thus, for example,

example, there would not be an uninhabited island and shore of the Seas of India, which you would not find planted with cocoa-trees, and sown with cocoa-nuts, which the Ocean wafts thither every year, and which it scatters alternately on their strands, by means of the variety of it's monsoons and of it's currents. Now, it is unquestionably certain, that the radiations of that tree and it's fruit, the principal focuses of which are in the Maldivia Islands, are not hitherto diffused over all the islands of the Indian Ocean.

The Philosopher *Francis Leguat*, and his unfortunate companions, who were, in the year 1690, the first inhabitants of the small Island of Rodriguez, which lies a hundred leagues to the eastward of the Isle of France, found no cocoa-trees in it. But, precisely at the period of their short residence there, the Sea threw upon the coast several cocoa-nuts in a state of germination; as if it had been the intention of Providence to induce them, by this useful and seasonable present, to remain on that island, and to cultivate it.

[†] *Francis Leguat*, who was unacquainted with the relations which seeds have to the element in which they are designed to grow, was very much astonished to find that those fruits, which weighed from five to six pounds, must have performed a
voyage

voyage of sixty or fourscore leagues, without being corrupted. He took it for granted, and he was in the right, that they came from the Island of St. Brande, which is situated to the North-east of Rodriguez. Those two desert islands had not, as yet, from the Creation of the World, communicated to each other all their vegetables, though situated in a current of the Ocean which sets in alternately, in the course of one year, for six months toward the one, and six months toward the other.

However this may be, they planted those cocoa-nuts, which, in the space of a year and a half, sent out shoots of four feet in height. A blessing from Heaven, so distinctly marked, had not the power of detaining them in that happy island. An inconsiderate desire of procuring for themselves women constrained them to abandon it, notwithstanding the remonstrances of *Leguat*, and plunged them into a long series of calamities, which few of them were able to survive. For my own part, I can entertain no doubt, that had they reposed that confidence in Providence which they had reason to do, it's care would have conveyed wives for them into that desert Island, as it had sent to them the gift of the cocoa-nut.

To

To return to the subject of vegetable navigation ; all the combinations and the versatilities of their sowings, would have been long ago completed in islands lying between the same parallels, and in the same monsoons, if the World had been eternal. The double cocoa-nuts, the nurseries of which are in the Sechelles Islands, would have diffused themselves, and would have had time to germinate on the Malabar coast, on which the Sea is from time to time throwing them. The Indians would have planted upon their shores those fruits to which they ascribed virtues so miraculous, while the palm-tree, which bears them, was so entirely unknown but twelve years ago to the people of this coast, that they believed them to be natives of the bottom of the Sea, and thence gave them the appellation of marine cocoa-nuts. There are, in like manner, a multitude of other fruits between the Tropics, of which the primordial stocks are in the Moluccas, in the Philippines, in the islands of the South-Sea, and which are entirely unknown on the coasts of both Continents, and even in the adjacent islands, which, undoubtedly, would have become there the objects of cultivation to their inhabitants, had the Sea been allowed sufficient time to multiply the projection of them on their shores.

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I shall pursue this reflection no farther ; but it evidently demonstrates the newness of the World. Were it eternal, and exempted from the care of a Providence, it's vegetables would long since have undergone all the possible combinations of the chance which re-sows them. We should find their different species in every situation where it was possible for them to grow. From this observation I deduce another consequence, namely this, That the AUTHOR of Nature evidently intended to link Mankind together, by a reciprocal communication of benefits, the chain of which is, as yet, very far from being completed. Where is, for example, the benefactor of Humanity, who shall transport to the Ostiaks and the Samoièdes of Waigatz Strait, Winter's tree from the Straits of Magellan, the bark of which unites the flavour of cloves, of pepper, and of cinnamon ? And who is the man that shall convey to Magellan's Strait the pease-tree of Siberia, to feed the starving Patagonian.

What a rich collection might Russia make, not only of the trees which thrive in the northern and the southern regions of America, but of those which, in all parts of the World, crown the lofty, ice-covered mountains, whose elevated ridges have a temperature approaching to that of her plains ? Wherefore beholds she not her forests enriched with the pines of Virginia, and with the cedars of
Mount

Mount Lebanon? The desert shores of the Irtis might every year clothe themselves with the same species of oats wherewith so many Nations, inhabiting the banks of the rivers of Canada are principally supported. Not only might she collect in her plains the trees and the plants of cold Latitudes, but a great number of annual vegetables, which grow during the course of a Summer, in warm and temperate Latitudes. I know, by experience, that the Summer's heat is as powerful at Petersburg as under the Line.

There are, besides, parts of the ground, in the North, which have configurations perfectly adapted to afford a shelter against the northerly winds, and to multiply the warmth of the Sun. If the South has it's icy mountains, the North has it's reverbatory vallies. I have seen one of those small vallies, near Petersburg, at the bottom of which flows a brook that never freezes, even in the midst of Winter. The rocks of granite, wherewith Finland is roughened all over, and which, according to the report of Travellers, cover most of the lands of Sweden, of the shores of the Frozen Ocean, and all Spitzbergen, are sufficient for producing the same temperatures, in many places, and for diminishing in them, to a considerable degree, the severity of the cold.

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I have seen, in Finland, near Wiburg, beyond the sixty-first degree of Latitude, cherry-trees entirely exposed to the weather, though these trees are natives of the forty-second degree; that is, of the kingdom of Pontus, from whence *Lucullus* transplanted them to Rome, after the defeat of *Mithridates*. The peasantry of that Province cultivate tobacco with success, which is a much more southerly plant, being originally a native of Brazil. It is, I admit, an annual plant, and that it does not acquire, in its northern situation, a very high degree of perfume; for they are under the necessity of exposing it to the heat of their stoves, in order to bring it to a state of perfect maturity. But the rocks with which Finland is covered over, would undoubtedly present, to attentive eyes, reverberating situations, which might bring it to a sufficient degree of maturity, without the aid of artificial heat.

I myself found, not far from the city of Fredericksham, upon a dunghill, under the shelter of a rock, a very lofty tuft of oats, the produce of a single seed, consisting of thirty-seven stalks, loaded with as many ears completely ripe, without reckoning a multitude of other small sucklers. I gathered it, with an intention of having it presented to her Imperial Majesty, *Catharine II.* by my General M. *Dubosquet*, under whose orders, and in
whose

whose company I was then visiting the fortified places of that province: it was likewise his intention; but our Russian attendants, careless, as all slaves are, suffered it to be lost. He was exceedingly vexed at this, as well as I: I cannot help thinking, that a sheaf of corn so rich and beautiful, the produce of a province, considered, even at Petersburg, as smitten with sterility, because of the rocks which cover it's surface, and procured for it, from ancient Geographers, the epithet of *lapidosa*, (stony) would have been as acceptable to her Majesty, as the huge block of granite which she has since had conveyed from thence, to be formed, at Petersburg, into the basis of a statue of *Peter* the Great.

I have seen, in Poland, several private individuals cultivate the vine and the apricot-tree with very great success. Mr. *de la Roche*, Consul from the Prince of Moldavia, carried me, when at Warsaw, to a little garden, in the suburbs of that City, which produced to the occupier an annual revenue of one hundred pistoles, though it did not contain quite thirty of the last-mentioned tree. It was totally unknown in that country a hundred and fifty years ago. The apricot was first introduced into it by a Frenchman, valet-de-chambre to a Queen of Poland. This man raised the fruit secretly, and made presents of it to the Grandees of the Country, pretending

pretending that he had received it from France, by the couriers of the Court. The great people did not fail to pay him magnificently for his presents ; and this species of commerce became to him the foundation of an ample fortune, by means of which his great-grand-children are at this day the most opulent Bankers of that Country.

What I have said respecting the possibility of enriching Russia and Poland with useful vegetables, is not only in the view of acknowledging, the best way in my power, the gracious reception with which I was honoured by persons of rank, and by the Government of those Countries, when I was a stranger among them ; but because these indications tend equally to the improvement of France, the Climate of which is more temperate. We have icy mountains, capable of producing all the vegetables of the North ; and reverberating vallies equally adapted to the production of most of those of the South. It would not be proper, as our custom is, to make an effort to render this species of culture general through a whole district, but to set it a-going in some little sheltered exposure, or small winding valley. The influence of these positions is of no great extent. Thus, the famous Constantia vine of the Cape of Good-Hope succeeds perfectly only on a small spot of ground, situated at the bottom of a little hill, whereas the

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adjoining and surrounding vineyards do not produce the muscadine grape of any thing like the same quality. Of this, too, I have my own personal experience.

In France, it would be proper to look for sheltered aspects, such as we have been describing, in places where there are white stones in abundance, the colour of which is the best adapted to reverberate the rays of the Sun. Nay, I believe, that marl is indebted to its white colour, for part of the heat which it communicates to the lands on which it is spread; for it reflects upon them the rays of the Sun with so much activity, as to burn up the first shoots of many herbs. This is the reason, if I am not mistaken, why marl, which has, in other respects, the principles of fecundation within itself, kills a great many of the smaller herbs, which are accustomed to grow under the shade of the corn, and whose first leaves are more tender than those of corn, which is, in general, the most hardy of gramineous plants.

It would be farther necessary to look for those fortunate exposures in the vicinity of the Sea, and under the influence of its winds, which are so necessary to the vegetation of many plants, that several of them refuse to grow in the inland parts of a country. Such is, among others, the olive-tree,
which

which it has been found impossible to propagate in the interior of Asia and of America; though the Latitude be, in other respects, favourable. Nay, I have remarked, that it is not fruitful in islands, and on shores where it is excluded from the sea-breezes. To this cause I ascribe the sterility of those which have been planted in the Isle of France, on it's western shore; for it is sheltered from the East-winds by a chain of mountains. As to the cocoa-tree, it will not thrive, between the Tropics, unless it has, if I may venture to say so, it's root in the sea-water. It is, I firmly believe, for want of those geographical considerations, and some others of a similar nature, that many plans of improvement in cultivation have failed in France, and in her Colonies.

However that may be, it might be possible to find, within the kingdom, an icy mountain, with, perhaps, a reverberating valley below. It would be a most agreeable employment to go in search of such a situation, and the greatest benefits might be derived from it. We might convert it into a Royal Garden, which should present to our Sovereign a spectacle of the vegetation of a multitude of climates, upon one line, of less than fifteen hundred fathoms of elevation. There he might bid defiance to the burning heat of the dog-star, under the shade of cedars, on the mossy bank of
Q 2 a rivulet

a rivulet issuing from the snow; and, perhaps, escape the severity of Winter's cold, at the bottom of a valley with a southern aspect, under the palm-tree, and amidst a field of sugar-canes. We might there naturalize the animals which are the compatriots of those vegetables. He might hear the braying of the rein-deer of Lapland, from the same valley in which he would see the peacocks of Java building their nests. This landscape would collect around him a part of the tributes of the Creation, and exhibit to him an image of the terrestrial paradise, which was situated, as I suppose, in a similar position. In serious truth, I cannot help expressing a wish, that our Kings would extend their sublime enjoyments, as far as the study of Nature has pursued it's researches under their flourishing Empire *.

It now remains, that I examine the harmonies which plants form with each other. These har-

* *Nescia mens hominum fati fortisque futuræ!* Ah, blind to futurity! Little did good *Saint-Pierre* think, that the ill-fated Prince, for whom he took so much delight to plant and decorate this earthly Paradise, was, in the course of a few fleeting years, to be dethroned, imprisoned, condemned, and publicly executed, in the Metropolis of his own Kingdom; and the very name of King proscribed by a Nation once enthusiastically attached to Royalty. How wonderful are the Works of Nature! How mysterious the Ways of Providence!

H. H.

monies

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VEGETABLE HARMONIES OF PLANTS.

We are going to apply to plants the general principles laid down in the preceding Study, by examining, one after another, the harmonies of their colours, and of their forms.

The verdure of plants, which is so grateful to the eye, is a harmony of two colours opposite in their elementary generation, of yellow, which is the colour of the Earth, and of blue, which is the colour of the Heavens. Had Nature dyed plants yellow, they would have been confounded with the ground ; if blue, they would have been confounded with the Heavens and the Waters. In the first case, all would have appeared earth ; in the second, all would have appeared sea : but their verdure gives them contrasts the most delightful with the grounds of this magnificent picture, and consonances equally agreeable with the yellow colour of the Earth, and with the azure of the Heavens.

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The green colour possesses this farther advantage, that it accords in a most wonderful manner with all the others, which arises from its being the harmony of the two extreme colours. Painters, who are endowed with taste, hang the walls of their exhibition-rooms with green, in order that the pictures, of whatever colours they may be, may detach themselves from that ground without harshness, and harmonize upon it without confusion*.

Nature, not satisfied with this first general tint, has employed, in extending it over the ground of her scene, what Painters call *transitions*. She has appropriated a particular shade of bluish green, which we call sea-green, to plants which grow in the vicinity of water, and of the Heavens. This is the shade which, in general, tinges the plants of the shores, as reeds, willows, poplars; and those of high grounds, as the thistle, the cypress, and the pine; and which makes the azure of the rivers to harmonize with the verdure of the

* Undoubtedly, when they put on a green ground, pictures of plants, or landscapes, such pictures detach themselves from it but indifferently. There is, in my opinion, a tint better adapted to be the ground of a picture-gallery; namely, gray. This tint, formed of black and white, which are the extremes of the chain of colours, harmonizes with every other, without exception. Nature frequently employs it in the Heavens, and on the Horizon, by means of vapours and of clouds, which are generally of that colour.

meadows,

meadows, and the azure of the Heavens with the verdure of the heights. Thus, by means of this light and fugitive tint, Nature diffuses delicious harmonies over the limits of the waters, and along the profiles of landscapes; and it is productive of a still farther magic to the eye, in that it gives greater apparent depth to the valleys, and more elevation to the mountains.

Something more wonderful still challenges our attention, namely this, that though she employs but one single colour in arraying so many plants, she extracts out of it a quantity of tints so prodigious, that each of those plants has it's own, peculiar to itself, and which detaches it sufficiently from it's neighbour to be distinguishable from it; and each of these tints is varying, from day to day, from the commencement of Spring, when most of them exhibit themselves in a bloody verdure up to the last days of Autumn, when they are transformed into various yellows,

Nature, after having thus harmonized the ground of her picture, by means of a general colour, has detached from it every vegetable in particular, by means of contrasts. Such as are designed to grow immediately on the ground, on strands, or on dusky rocks, are entirely green, leaves and stems, as the greatest part of reeds, of grasses, of mosses,

of tapers, and of aloès; but those which are destined to arise out of the midst of herbage, have stems of different tints of brown; such are the trunks of most trees, and the stalks of shrubs. The alder, for example, which thrives amidst the grassy turf, has stems of an ash-coloured gray; but the wallwort, which entirely resembles it in all other respects, and which grows immediately on the ground, is green all over. The mugwort, which grows along hedges, has reddish stems, by which it is easily distinguishable from the neighbouring shrubs. Nay, there are, in every genus of plants, certain species which, by their shining colours, seem to have been formed for terminating the limits of their classes. Such is, in the forb genus, a species called the Canadian service tree, the branches of which are of a coral red. There are, in the willow tribe, osiers whose scions are as yellow as gold; but there is not a single plant which does not detach itself entirely from the ground which surrounds it by its flowers and by its fruits.

It is impossible to suppose that so many varieties should be mechanical results of the colour next to which bodies are placed; for example, that the bluish green of most mountain-vegetables should be an effect of the azure of the Heavens. It is worthy of being remarked, that the blue colour is
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not to be found, at least as far as I know, in the flowers or in the fruits of lofty trees ; for, in this case, they would be confounded with the Heavens ; but it is very common on the ground, in the flowers of herbs, such as the blue-bottle, the scabious, the violet, the liverwort, the iris, and many others. On the contrary, the colour of the earth is very common in the fruits of lofty trees, such as the chestnut, the walnut, the cocoa-nut, and the cone of the pine. Hence we have an intimation, that the point of view of this magnificent picture was taken from the eye of Man.

Nature, after having distinguished the harmonic colour of each vegetable, by the contrasting colour of it's flowers, and of it's fruits, has followed the same laws in the forms which she has given them. The most beautiful of forms, as we have seen, is the spherical form ; and the most agreeable contrast which it is capable of forming, is when found in opposition to the radiating form. You will frequently find this form and it's contrast in the aggregation of the flowers that go by the name of radiated, as the daisy, which has a circle of small white divergent petals, surrounding it's yellow disk : we find it, likewise, with other combinations, in the blue-bottle, in the asters, and a multitude of other species. When the radiating parts of the flower are outermost, the spherical parts are
inmost,

inmost, as in the species which I have just named ; but when the first are inmost, the spherical parts are outmost ; this may be remarked in those whose stamina are drawn out into length, and the petals in spherical portions, such as the flowers of the hawthorn and of the apple-tree, and most part of the rosaceous and liliaceous plants. Sometimes the contrast of the flower is with the surrounding parts of the plant. The rose is one of those in which it is most strongly marked ; it's disk is formed of beautiful spherical portions, it's calix is bristled with beards, and it's stalk with thorns,

When the spherical form is found placed, in a flower, between the radiating and the parabolic, then there is a complete elementary generation, the effect of which is always highly agreeable ; it is this, too, which is produced by most of the flowers that have just been named, by the profile of their calices, which terminate their projecting stems. The nosegay girls are so sensible of the value of this combination, that they sell a simple rose on it's branch at a much higher price than they would ask for a large posy of the same flowers, especially if there are on it a few buds, which present the charming progressions of the florification. But Nature is so vast, and my incapacity so great, that I must restrict myself to throwing a simple glance on the contrast, which arises from the
simple

simple opposition of forms : it is so universal, that Nature has given it to plants which had it not in themselves, by opposing them to others which have a configuration entirely different.

The species opposite in forms are almost always in company. When you fall in with an old willow, on the bank of a river, which art has not degraded, you may frequently see upon it a great convolvulus covering the radiated foliage of the tree with its own heart-formed leaves, and its bell-shaped white flowers, to make up the defect of apparent flowers, which Nature has denied to this tree. Different species of ropeweed produce the same harmonies on various species of high gramineous plants.

These plants, called creeping, are scattered over the whole vegetable kingdom, and are appropriated, as I suppose, to each vertical species. They have a great variety of methods of fixing themselves on the upright plant, which would alone merit a particular treatise. There are some which turn themselves spirally around the trunks of forest trees, such as the honey-suckle ; others, as pease, have hands with three to five fingers, by which they lay hold of shrubbery : it is very remarkable, that those hands do not make their appearance till they have acquired a height at which they begin to
have

have occasion for them as a support; others, as the bastard-pomegranate, attach themselves in form of cork-screw; others form a simple hook with the tail of their leaf, as the nasturtium: the pink employs a similar method of adhesion. These two beautiful flowers are supported in our gardens with rods; but it would be a problem well worthy of the investigation of Florists, to ascertain what are the auxiliary plants, if I may call them so, to which these were designed to unite themselves, in the places where they are native: delightful groups might be formed by their re-union.

I am persuaded that there is not a vegetable but what has it's opposite in some parts of the Earth: their mutual harmony is the cause of the secret pleasure which we feel in wild rural scenes, where Nature is at liberty to combine them. The fir-tree rises, in the forests of the North, like a lofty pyramid, of a dark green, and with a motionless attitude. The birch is almost always found in it's vicinity, and grows to nearly the same height, is of the form of an inverted pyramid, of a lively verdure, with a moveable foliage, continually playing about with every breath of the wind. The round-leaved trefoil loves to grow in the midst of the fine grass, and to adorn it with it's own flowery nosegay. Nay, I believe that Nature has made those deep incisions in the leaves of a great many vegetables,

vegetables, entirely in the view of facilitating alliances of this sort, and of opening a passage for the grasses, the verdure and delicacy of whose stems form with them an infinity of contrasts. Of this instances innumerable may be seen in uncultivated fields, where tufts of grass pierce through the broad plants of the thistle and the echium. This arrangement has, likewise, been made, in order that the grasses, which are most useful of all vegetables, might receive a portion of the rain from Heaven, through the interstices of the broad foliage of those privileged children of Nature, which would stifle every thing around them, but for those profound incisions. Nature does nothing merely for the pleasure of doing it, but always connects with it some reason of utility: this appears to me the so much more decidedly marked, that the incisions in leaves are much more common, and deeper in the plants and under-shrubbery, which rise to no great height, than in trees.

The harmonies resulting from contrast, are to be found even in the waters. The reed, on the brink of rivers, raises into the air it's radiating leaves, and it's embrowned distaff, whereas the nymphæa extends at it's feet a broad heart-formed foliage, and roses of yellow gold: the one presents, on the waters, a continued pallisade, and the other a platform of verdure.

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Similar oppositions present themselves in the most frightful of climates. *Martens*, of Hamburg, who has given us a very good account of Spitzbergen, tells us, that when the seamen belonging to the vessel in which he navigated along its coasts, heaved up the anchor, they seldom failed to bring up with it a very broad leaf of the *alga marina*, six feet in length, and attached to a tail as long: this leaf was smooth, of a brown colour, spotted with black, striped with two white stripes, and made in form of a tongue: he calls it the plant of the rock. But what is very singular, it was usually accompanied by a hairy plant, about six feet in length, like a horse's tail, and formed of hairs so fine, that one might denominate it, says he, the silk of the rock. He found on those dismal shores, where the empire of *Flora* is in such a state of desolation, the *cochlearia* (scurvy grass) and the sorrel, which grew together. The leaf of the first is rounded in form of a spoon, that of the other is lengthened into the shape of the iron head of an arrow. A Physician of considerable ability, of the name of *Bartholin**, has observed, that the virtues of their salts are as opposite as their configurations; those of the first are alkalis, those of the other are acids; and from their union results what medical men call a neutral salt,

* See *Chomel's History of Common Plants.*

which

which they ought rather to call a harmonic salt, the most powerful remedy which can be employed as an antiscorbutic, and the scurvy is a disease which is readily, and usually caught in those dreadful climates.

For my own part, I apprehend that the qualities of plants are harmonic as their forms; and that as often as we find them grouped agreeably and constantly, there must result from the union of their qualities, for nourishment, for health, or for pleasure, a harmony as agreeable as that which arises from the contrast of their figures. This is a presumption that I could support, by referring to the instinct of animals, which, in browsing on the herbage, vary the choice of their aliments; but this consideration would lead me away from my subject.

I should never come to a conclusion, were I to go into a detail respecting the harmonies of so many plants which we undervalue, because they are feeble or common. If we suppose them, for thought's sake, of the size of our trees, the majesty of the palm-tree would disappear before the magnificence of their attitudes and of their proportions. Some of them, such as the echium, rise like superb candlesticks, forming a vacuum round their centre, and rearing toward Heaven their prickly

prickly arms, loaded, their whole length through, with lamps of violet-coloured flowers. The verbascum, on the contrary, extends around it, it's broad leaves of solemn drapery, and sends up from it's centre a long distaff of yellow flowers, as salutary to the stomach, as grateful to the touch. The violet, of deep blue, contrasts, in the Spring, with the primrose, expanding it's golden cup with a scarlet brim. On the embrowned angles of the rock, under the shade of ancient beech-trees, the mushroom, white and round as an ivory piece for the chess-board, arises out of a bed of moss of the most beautiful green.

Mushrooms alone present a multitude of unknown consonances and contrasts. This class is, first, the most varied of all those of the vegetables of our climates. *Sebastian le Vaillant* enumerates one hundred and four species of them in the vicinity of Paris, without taking into the account the fungoids, which furnish, at least, a dozen more. Nature has dispersed them over most shady places, where they frequently form contrasts the most extraordinary. There are some which thrive only on the naked rock, where they present a forest of small filaments, each of which supports it's particular chapter. There are some which grow on substances the most abject, with forms the most solemn; such is that which thrives on what falls
from

from the horse, and which resembles a Roman hat, whence it has borrowed it's name. Others present agreeable consonances : such is that which grows at the foot of the alder, under the form of a cockle. What nymph has planted a shell by the root of a tree of the rivers ?

This numerous tribe appears to have it's destiny attached to that of the trees, which have each a mushroom appropriated to itself, and rarely to be found elsewhere : such are those which grow only on the roots of plumb-trees and pines. To no purpose does Heaven pour down it's copious rains ; the mushroom, under covert of it's umbrella, receives not a single drop. They derive the whole support of life from the Earth, and from the potent vegetable to whose fortune they have united their own : like those little Savoyards, who are planted as posts at the gates of the hotels of the Great, they extract their subsistence out of the superfluity of another ; they grow under the shade of the Powers of the forest, and live on the superabundance of their sumptuous banquets.

Other vegetables present oppositions of strength to weakness in a different way, and consonances of protection still more distinguished. Those which we have been mentioning, like lordly Chieftains, leave their humble friends at their feet : the others

carry them in their arms, and place them upon their heads. They frequently receive the recompence of their noble hospitality. The liannes which, in the Antilles-Islands, attach themselves to the trees of the forest, defend them from the fury of the hurricane. The Gallic Oak has oftener than once seen itself an object of veneration to the Nations, from having carried the mistletoe in it's branches. The ivy, a friend to monuments and tombs; the ivy, with which, in ancient times, they crowned the Poets who conferred immortality, sometimes covers with it's foliage the trunks of the stateliest trees. It is one, among many, of the irresistible proofs of the vegetable compensations of Nature; for I do not recollect that I ever saw the ivy on the trunks of pines, of firs, or of other trees whose foliage lasts all the year round. It invests those only which are stripped by the hand of Winter. Symbol of a generous friendship, it attaches itself only to the wretched; and when death itself has smitten it's protector, it restores him again the honours of the forest where he lives no longer; it makes him revive, by decorating his shade with garlands of flowers, and festoons of undecaying verdure.

The greatest part of plants which grow under the shade, are adorned with the most vivid colours; thus the mosses display the brilliancy of their emerald

rald green on the dusky sides of the rocks. In the forests, the mushroom and the agaricum distinguish themselves by their colours from the roots of the trees under which they grow. The ivy detaches itself from their gray barks by it's shining green; the mistletoe discloses it's branches of a yellowish green, and it's fruits similar to pearls, amidst the thick foliage of the oak. The aquatic convolvulus dazzles you with it's large white bell-shaped flowers on the trunk of the willow. The virgin's-bower clothes with verdure the ancient towers, and, in Autumn, her foliage of gold and purple, seems to fix, on their sober eminences, the rich colours of the setting Sun. Other plants, entirely concealed from the eye, discover themselves by their perfumes. It is thus that the obscure violet invites the hand of lovers to the bosom of the prickly shrub. And thus is verified, on every hand, that great Law of contrasts, which governs the World : No aggregation is, in plants, the effect of chance.

Nature has established, in the numerous tribes of the vegetable kingdom, a multitude of alliances, the end of which is unknown to us. There are plants, for example, the sexes of which are on different individuals, as in the animal Creation. There are others whom you always find united in several clusters, as if they loved to live in society ;

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others,

others, on the contrary, you almost always meet with in a state of solitude. I presume, that many of these relations are connected with the character of the birds which live on their fruits, and which re-sow them. The herbage in the meadows frequently represent the bearing of the trees in the forests; there are some which, in their foliage and proportions, resemble the pine, the fir, and the oak: nay, I believe that every tree has a consonance in it's corresponding herb. It is by a magic of this sort, that small spots of ground present to us the extent of a large district. If you are under a grove of oaks, and perceive, on an adjoining hillock, tufts of germander, the foliage of which resembles them in miniature, and you will feel all the effect of a perspective. These diminutions of proportion extend from trees even down to mosses, and are the causes, in part, of the pleasure which we enjoy in wild rural scenes, where Nature has had leisure to dispose and accomplish her plans. The effect of those vegetable illusions is so undoubtedly certain, that if you have the ground cleared, the extent of any particular spot, when stripped of it's natural vegetables, appears much smaller than before.

Nature farther employs diminishing shades of verdure, which, being lighter on the summit of trees than at their base, gives them the appearance
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of being more lofty than they really are. She appropriates, besides, the pyramidical form to many mountain-trees, in order to increase the apparent elevation of their site; this is observable in the larch, the fir, the cypress, and in many other plants, which grow on heights. She sometimes unites, in the same place, the effects of seasons and of climates the most opposite. She clothes, in hot climates, the whole sides of mountains with the vegetable called the ice-plant, because it seems entirely covered over with flakes of ice; you would believe that, in the midst of Summer, *Boreas* had breathed upon it all the chilling blasts of the North.

On the other hand, we find, in Russia, mosses in the midst of Winter; which, from the red and smoky colour of their flowers, have the appearance of being set on fire. In our rainy climates, she crowns the summits of hillocks with broom and rosemary; and the tops of ancient towers with the yellow gilly-flower: in the midst of the gloomiest day, you would imagine you saw the rays of the Sun shining upon them.

In another place, she produces the effect of the wind in the midst of perfect stillness. In many parts of America, a bird has only to alight on a

tuft of the fenfitive plant, in order to put in motion the whole ftripe, which fometimes extends to three furlongs. The European traveller ftands ftill, and obferves, with aftonifhment, the air tranquil, but the herbage in motion. I myfelf have fometimes miftaken, in our own woods, the murmur of poplars and of afpins, for the bubbling of brooks. Oftener than once, feated under their fhade, on the fkirt of a meadow, whole herbage the winds put into an undulatory motion, this multiplied tremulousnefs has transfufed into my blood the imaginary coolnefs of the ftream.

Nature frequently employs the aërial vapours, in order to give a greater extent to our landfcapes. She diffufes them over the cavities of vallies, and ftops them at the windings of rivers, giving you a glimpe, at intervals, of their long canals, illuminated by the Sun. She thus multiplies their plans, and prolongs their extent. She fometimes withdraws this magic veil from the bottom of the vallies; and rolling it over the adjacent mountains, on which ſhe tinges it with vermilion and azure, ſhe confounds the circumference of the Earth with the vault of Heaven. It is thus, that ſhe employs clouds as evaneſcent as the illuſions of human life, to raife us to Heaven; it is thus that ſhe expands over her moſt profound myſteries, the ineffable
ſenſations

sensations of infinity, and that she withdraws from our senses the perception of her Works, in order to convey to our minds a more impressive feeling of them.

ANIMAL HARMONIES OF PLANTS.

Nature, after having established on a soil formed of fragments, insensible and lifeless, vegetables endowed with principles of life, of growth, and generation, accommodated to these beings which had, together with these same faculties, the power of self-motion, dispositions to inhabit them, passions to derive their nourishment from them, and an instinct which impels them to make a proper choice: these are animals. I shall here speak only of the most common relations which they have with plants; but were I to attempt a detail of those which their innumerable tribes have with the elements, with each other, and with Man, whatever might be my ignorance, I should disclose a multitude of scenes still more worthy of admiration.

In an order entirely new, Nature has not changed her Laws: she has established the same harmonies and the same contrasts, of animals to plants, as of plants to the elements. It would appear natural

to our feeble reason, and consonant to the great principles of our Sciences, which ascribe so much power to analogies, and to physical causes, that so many sensible beings which are produced in the midst of verdure, should be, in process of time, affected by it. The impressions of their parents, added to those of their own infancy, which serve to explain so many appearances in the human species, acquiring, in them, increasing strength, from generation to generation, by new tints, ought, at length, to exhibit oxen and sheep as green as the grass on which they pasture. We have observed, in the preceding Study, that as vegetables were detached from the ground by means of their green colour, the animals which live on verdure distinguish themselves from it, in their turn, by means of their dusky colours; and those which live on the dusky barks of trees, or of other dark grounds, are invested with colours brilliant, and sometimes green.

On this subject, I have to remark, that many species of the birds of India, which live amidst the foliage of trees, as the greatest part of paroquets, many of the colibri, and even of turtles, are of the finest green; but independantly of the white, blue, and red marbled spots, which distinguish their different tribes, and render them perceptible at a distance upon the trees, the brilliant verdure of
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their plumage detaches them, to great advantage, from the solemn and imbrowned verdure of those southern forests. We have seen that Nature employs this as the general means of diminishing the reflexes of the heat; but, that she might not confound the objects of her picture, if she has darkened the ground of her scene, she has bestowed greater brilliancy on the dresses of the actors.

It would appear that Nature has appropriated the species of animals coloured, in the most agreeable manner, to the species of vegetables, whose flowers are the least vivid, as a compensation. There are much fewer brilliant flowers between the Tropics, than in the temperate Zones; and, as a compensation, the insects, the birds, and even the quadrupeds, such as several species of monkeys and lizards, are there arrayed in the most lively colours. When they rest on their proper vegetable, they form with them the most beautiful contrasts, and the most lovely harmonies. I have often stood still, in the West-Indies, to contemplate the little lizards, which live on the branches of trees, employ themselves in catching flies. They are of a beautiful apple-green, and have on their back a sort of characters of the most vivid red, resembling the letters of the Arabian alphabet. When a cocoa-tree had several of them dispersed along its stem, never was there Egyptian Pyramid
of

of porphyry, with it's hieroglyphics, so mysterious, and so magnificent, in my eyes *.

I have, likewise, seen flocks of small birds, denominated *cardinals*, because they are red all over, settle on shrubbery, the verdure of which was blackened by the Sun, and present the appearance of girandoles studded with little burning lamps. Father *du Tertre* says, that there is not, in the Antilles, a spectacle more brilliant, than the alighting of coveys of the parrot species, called *arras*, on the summit of a palm-tree. The blue, the red, and the yellow of their plumage, covers the boughs of the flowerless tree, with the most superb enamel. Harmonies somewhat similar may be seen in our own climates. The goldfinch, with his red head, and wings tipped with yellow, appears, at a distance, on a bush, like the flower of the thistle in which he was hatched. You would sometimes take the slate-coloured wagtail, when perched on the extremity of the leaves of a reed, for the flower of the iris.

* They have sometimes served me to explain the moral sense of hieroglyphics, engraven on the obelisks of Egypt, in honour of her conquering heroes. On beholding the characters traced upon them from right to left, with heads, beaks and paws, they brought to my recollection the little fly-catchers of my palm-trees.

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It would be a very great curiosity to collect a great number of these oppositions, and of those analogies. They would lead us to a discovery of the plant, which is peculiarly adapted to each animal. Naturalists have paid to those adaptations no great degree of attention; such of them as have written the History of Birds, have classed them according to the feet, the bill, the nostrils. They sometimes speak of the seasons of their appearance, but scarcely ever of the trees which they frequent. Those only who, employed in making collections of butterflies, are frequently under the necessity of looking for them in their state of nymph, or caterpillar, have sometimes distinguished those insects by the names of the vegetables on which they found them. Such are the caterpillars of the tithymale, of the pine, of the elm, and so on, which they discovered to be peculiarly appropriated to these vegetables. But there is not an animal existing but what may be referred to its own particular corresponding plant.

We have divided plants into aërial, aquatic, and terrestrial, as animals themselves are divisible, and we have found, in the two extreme classes, unvarying harmonies with their elements. They may be farther divided into two classes, into trees and herbs, as animals likewise are into volatile and quadrupeds. Nature does not associate the two
kingdoms

kingdoms in consonances, but in contrasts; that is, she does not attach the great animals to the great vegetables; but unites them contrariwise, by associating the class of trees with that of the small animals, and that of herbs with the great quadrupeds: and by means of these oppositions, she bestows adaptations of protection to the feeble, and of accommodation to the powerful.

This Law is so general, that I have remarked, in every country, where there is no great variety in the species of grasses, those of the quadrupeds which live upon them are but few in number; and that wherever the species of trees are multiplied, those of volatiles are likewise so. The truth of this may be ascertained by consulting the herbals of many parts of America, and, among others, those of Guyana and of Brasil, which present but few varieties in the grasses, but a great number in the trees. It is well-known that those countries have, in fact, few quadrupeds natural to them, and that they are peopled, on the contrary, with an infinite variety of birds and insects.

If we cast a glance on the relations of grasses to quadrupeds, we shall find that, notwithstanding their apparent contrasts, there is actually between them a multitude of real correspondencies. The small elevation of the gramineous plants places them
within

within the reach of the jaws of quadrupeds, whose head is in a horizontal position, and frequently inclined toward the ground. Their delicate shoots seem formed to be laid hold of by broad and fleshy lips; their tender stems, easily snapped by the incisive teeth; their mealy feeds easily bruised by the grinders. Besides, their bushy tufts, and elastic without being ligneous, present soft litter to ponderous bodies.

If, on the contrary, we examine the correspondencies which exist between trees and birds, we shall find that the branches of trees may be easily clasped by the four-toed feet of most birds, which Nature has disposed in such a manner, that by means of three before and one behind, they may be able to grasp the bough as with a hand. Again, the birds find, in the different tiers of the foliage, a shelter against the rain, the Sun, and the cold, toward which the thickness of the trunks farther contribute. The apertures formed in these, and the mosses which grow upon them, furnish situations for building their nests, and materials for lining them. The round or oblong seeds of trees are accommodated to the form of their bills. Such as bear fleshy fruits are resorted to by birds, which have beaks pointed, or crooked, like a pick-axe.

In

In the islands of the regions situated between the Tropics, and along the banks of the great rivers of America, the greatest part of maritime and fluviatic trees, among others, many species of the palm-tree, bear fruits enclosed in very hard shells, whereby they are enabled to float on the face of the waters, which re-fow them at a great distance; but their covering does not secure them from the attack of the birds. The different tribes of paroquets which have made them their habitation, and of which I have reason to believe that there is a species appropriated to each species of palm-tree, easily find means to open their hard cases with hooked bills, which pierce like an awl, and hold fast like pincers.

Nature has, farther, accommodated animals of a third order, which find in the bark, or in the flower of a plant, as many conveniencies as the quadruped has in a meadow, or the bird in the whole tree: I mean the insects. Certain Naturalists have divided them into six great tribes, which they have characterized, according to custom, but to very little purpose, by Greek names. They class them into *coléopterous*, or cased, insects; as the scarab tribe, such are our may-bugs, or chafers: into *hémipterous*, or half-cased, as the gallinsects, such is the kermés: into *tétrapterous farinaceous*, or four-mealy-winged, as butterflies; into *tétrapterous*,
without

without any addition, or four-naked-winged, as bees; into *dipterous*, or two-winged, as the common fly; and into *apterous*, or wingless, as the ant. But these six classes admit of a multitude of divisions and of subdivisions, which unite species of insects, of forms and instincts the most dissimilar; and separate a great many others of them which have otherwise a very striking analogy among themselves.

Whatever may be in this, the order of animals in question appears to be particularly attributed to trees. *Pliny* observes that ants are singularly fond of the grains of the cypress. He tells us, that they attack the cones which contain them, on their half-opening as they arrive at maturity, and plunder them to their very last seed; and he considers it as a miracle of Nature, that an insect so diminutive should destroy the seed of one of the largest trees in the World. I believe we never shall be able to establish, in the different tribes of insects, a real order, and in the study of them, that pleasure and utility of which it is susceptible, but by referring them to the different parts of vegetables. Thus we might refer to the nectars of the flowers, the butterflies and flies which are furnished with a proboscis for sipping up their juices; to their stamina, those flies which, like the bee, have spoon-mouths scooped out in their thighs, lined with
hair,

hair, for collecting their powder, and four wings to assist them in carrying off their booty; to the leaves of plants, the common flies and the gallinsects, which have pointed and hollow prongs for making incisions in them, and for drinking up their fluids; to the grains, the scarab race, as the weevil, which is designed to force it's way into the heart of the seed to feed upon it's meal, and which is provided with wings, inclosed in cases, to prevent their being injured, and with a file to open for itself a passage; to the stem, those worms which are quite naked, because they have no need of being clothed in a substance of wood, which shelters them on every side, but they are furnished with augers, by the help of which they sometimes go nigh to destroy whole forests; finally, to the wreck of every sort, the ants which come armed with pincers, and with an instinct of advancing in bands to cut to pieces, and to carry off every thing that suits their purpose.

The desert of this vast vegetable banquet is hurled down by the rainy torrents to the rivers, and thence to the Sea, where it presents a new order of relation with the fishes. It is worthy of remark, that the most attractive baits which can be presented to them, are deduced from the vegetable kingdom, and particularly from the grains, or from the substances of the plants, which have
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the aquatic characters which we have indicated, such as the hard shell of the Levant, the rush of Smyrna, the juice of the tithymal, the Celtic spikenard, the cummin, the anise, the nettle, the sweet-marjoram, the root of the birthwort, and the seed of the hemp. Thus, the relations of these plants with fishes confirm what has been said of those of their grains with the waters.

By referring the different tribes of insects to the different parts of plants, and in that way only, can we discern the reasons for which Nature has been determined to bestow on those diminutive animals figures so extraordinary. We should then know the uses of their utensils, of which the greater part is hitherto unknown; and we should have continually new occasion to admire the Divine Intelligence, and to perfect our own. On the other hand, such progress in knowledge would diffuse the clearest light over many parts of plants, the utility of which is a world unknown to Botanists, because they have consonances only with animals.

I am persuaded, that there is not a single vegetable but what has connected with it, at least, one individual of each of the six general classes of insects, acknowledged by Naturalists. As Nature has divided each genus of plants into different species, in order to render them capable of growing

in different situations; she has, in like manner, divided each genus of insects into different species, in order to adapt them to inhabit different species of plants. For this reason she has painted, and numbered, in a thousand different but invariable ways, the almost infinite divisions of the same branch. For example, we constantly find on the elm the beautiful butterfly, called the gold-brocade, on account of it's rich colouring. That which goes by the name of the four omicrons, and which lives I know not where, always produces descendants impressed with that Greek character, four times, on their wings. There is a species of bee with five claws, which lives on radiated flowers only; without those claws, she could not cling fast to the plane mirrors of those flowers, and load herself from their stamina, so easily as the common bee, which usually labours at the bottom of those which have a deep corolla.

Not that I imagine any one plant nourishes, in it's different varieties, all the collateral branches of one family of insects. I believe that each genus of these extends much farther than the genus of plants which serves as it's principal basis. In this, Nature manifests another of her Laws, by virtue of which she has rendered that the best which is the most common. As the animal is of a nature superior to the vegetable, the species of the first
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are more multiplied, and more generally diffused than those of the second. For example, there are not so many as sixteen hundred species of plants in the vicinity of Paris; but within the same compass, there are enumerated near six thousand species of flies. This leads me to presume, therefore, that the different tribes of plants cross with those of animals, which renders their species susceptible of different harmonies. Of this a judgment may be formed from the variety of tastes, in birds of the same family. The black-headed yellow-hammer nestles in the ivy; the red-headed in walls, in the neighbourhood of hemp-fields; the brown yellow-hammer builds on trees by the highway's-side, where she finishes off her nest with horse-hair. A dozen species of that bird are enumerated in our climates, each of which has its particular department. Our different sorts of larks are likewise apportioned to different situations; to the woods, to the meadows, to the heaths, to arable lands, and to the shores of the Sea.

Very interesting observations may be made respecting the duration of vegetables, which are unequal, though subjugated to the influences of the same elements. The oak serves as a monument to the nations; and the *noctuidum*, which grows at his foot, lives only a single day. All I shall say upon this head, in general, is, that the period of

their decay is by no means regulated in conformity to that of their growth; neither is that of their fecundity proportioned to their weakness, to climates, or to seasons, as some have pretended. *Pliny* * quotes instances of holmes, of plane-trees, and of cypresses, which existed in his time, and which were more ancient than Rome, that is, more than seven hundred years old. He farther tells us, that there were still to be seen near Troy, around the tomb of Ilus, oaks which had been there from the time that Troy took the name of Ilium, which carries us back to an antiquity much more remote.

I have seen, in Lower Normandy, in a village church-yard, an aged yew, planted in the time of *William* the Conqueror; it is still crowned with verdure, though it's trunk cavernous, and through and through pervious to the day, resembles the staves of an old cask. Nay, there are bushes which seem to have immortality conferred upon them. We find, in many parts of the kingdom, hawthorns, which the devotion of the Commonalty has consecrated by images of the Virgin, and which have lasted for several ages, as may be ascertained by the inscriptions upon the chapels which have been reared in the vicinity.

* Natural History, book xvi. chap. 44.

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But, in general, Nature has proportioned the duration and the fecundity of plants to the demands of animal life. A great many plants expire as soon as they have yielded their feed, which they commit to the winds. There are some, such as mushrooms, whose existence is limited to a few days, as the species of flies which feed upon them. Others retain their seeds all the Winter through, for the use of the birds; such are the fruits of most shrubs.

The fecundity of plants is by no means regulated according to their size; but proportionally to the fecundity of the animal species which is to feed upon them. The pannic, and the small millet, and some other gramineous plants, so useful to man and beast, produce incomparably more grains than many plants, both greater and smaller than themselves. There are many herbs which perpetuate themselves, by their seeds, only once a year; but the chickweed renovates itself by it's seeds, up to seven or eight times, without being interrupted in the process even by Winter. It produces ripe seeds within six weeks from the time of it's being sown. The capsule, which contains them, then inverts itself, turning toward the earth, and half opens, to leave them at liberty to be carried away by the winds, and the rains, which

sow them again every where. This plant ensures, the whole year through, the subsistence of the small birds of our climates. Thus, Providence is so much the more powerful, as the creature is more feeble.

Other plants have relations to animals the more tenderly affecting, in proportion as climates and seasons seem to exercise over the animal the greater degree of severity. Were we enabled to investigate these adaptations to the bottom, they would explain all the varieties of vegetation, in every latitude, and in every season. Wherefore, for example, do most of the trees of the North shed their leaves in Winter; and wherefore do those of the South retain theirs all the year round? Wherefore, in defiance of the Winter's cold in the North, do the firs there continue always clothed with verdure? It is a matter of no small difficulty to discover the cause of this; but the end is obviously discernible. If the birch and the larch of the North drop their foliage, on the approach of Winter, it is to furnish litter to the beasts of the forest; and if the pyramidical fir there retains its leaves, it is to afford them shelter amidst the snows. This tree then presents to the birds the mosses which are suspended on its branches, and its cones replenished with ripe kernels. In their vicinity

vicinity, oftentimes, thickets of the service-tree display for their use the shining clusters of their scarlet berries.

In the Winters of our climates, many evergreen shrubs, as the ivy, the privet, and others, which remain loaded with black or red fruit, contrasting strikingly with the snow, as the primrose, the thorn, and the eglantine, present to the winged creation both a habitation and food. In the countries of the Torrid Zone, the earth is clothed with fresh lianes, and shaded with trees of a broad foliage, under which animals find a cool retreat. The trees themselves, of those climates, seem afraid of exposing their fruits to the burning heat of the Sun: instead of rearing them as a cone, or exhibiting them on the circumference of their heads, they frequently conceal them under a thick foliage, and bear them attached to their trunks, or at the sprouting of their branches: such are the *jacquier*, the banana, the palm-tree of every species, the *papayer*, and a multitude of others. If their fruits invite not the animals externally, by vivid colours, they call them by the noise which they excite. The lumpy cocoa-nut, as it falls from the height of the tree which bears it, makes the earth resound to a considerable distance. The black pods of the *cannescier*, when ripe, and agitated by the wind, produce, as they

clash against each other, a sound resembling the tic-tac of a mill. When the grayish fruit of the genipa of the Antilles comes to maturity, and falls from the tree, it bounces on the ground with a noise like the report of a pistol *. Upon this signal, more than one guest, no doubt, resorts thither in quest of a repast. This fruit seems particularly destined to the use of the land-crabs, which are eagerly fond of it, and very soon grow fat on this kind of food. It would have answered no purpose to them to see it on the tree, which they are incapable of climbing; but they are informed of the moment when it is proper for food, by the noise of it's fall.

Other fruits, as the jaque and mango, affect the sense of smelling in animals so powerfully, as to be perceptible more than the quarter of a league distant, when the fruit is to windward. I believe that this property, of emitting a powerful perfume, is likewise common to such of our fruits as lie concealed under the foliage, apricots, for instance. There are other vegetables which manifest themselves to animals, if I may use that expression, only in the night-time. The jalap of Peru, or the belle of the night, opens not her strongly-scented flowers except in the dark. The

* Father du Tertre's History of the Antilles.

flower of the nasturtium, or nun, which is a native of the same country, emits, in the dark, a phosphoric light, observed, for the first time, in Europe, by a daughter of the celebrated *Linnaeus*.

The properties of these plants convey a happy idea of those delightful climates, in which the nights are sufficiently calm, and sufficiently luminous to disclose a new order of society among animals. Nay, there are insects which stand in no need of any pharos to assist them in steering their nocturnal courses. They carry their lanterns about them ; such are the species of luminous flies. They scatter themselves, sometimes, in the groves of orange-trees, of papayas, and other fruit-trees, in the midst of the darkest night. They dart, at once, by several reiterated beatings of their wings, a dozen of fiery streams, which illuminate the foliage and fruits of the trees whereon they settle, with a golden and bluish light * ; then, all at once repressing their motion, they plunge again into obscurity. They alternately resume and intermit this sport during the whole night. Sometimes there are detached from them swarms of brilliant sparks of light, which rise into the air, like the emanations of a firework.

* Consult the same Work of *du Tertre*.

Were we to study the relations which plants have to animals, we should perceive in them the use of many of the parts, which are frequently considered as productions of the caprice, and of the confusion, of Nature. So widely extended are those relations, that it may be confidently affirmed, that there is not a down upon a plant, not an intertexture of a shrub, not a cavity, not a colour of leaf, not a prickle, but what has it's utility. Those wonderful harmonies are especially to be remarked, with relation to the lodgings and the nests of animals. If, in hot countries, there are plants loaded with down, it is because there are moths, entirely naked, which clip off their fleece, and weave it into clothing. There is found, on the banks of the Amazon, a species of reed, from twenty-five to thirty feet high, the summit of which is terminated by a large ball of earth. This ball is the workmanship of the ants, which retire thither at the time of the rains, and of the periodical inundations of that river: they go up, and descend along the cavity of this reed, and live on the refuse which is then swimming around them on the surface of the water.

It is, I presume, for the purpose of furnishing similar retreats to many small insects, that Nature has hollowed the stems of most of our plants of the shore.

shore. The valisneria *, which grows in the stream of the Rhone, and carries it's flower on a spiral stem, capable of being drawn out in proportion to the rapidity of the sudden swellings of that river, has holes pierced through at the basis of it's leaves, the use of which is much more extraordinary. If you take up this plant by the root, and put it into a large vessel full of water, you perceive, at the basis of it's leaves, masses of a bluish jelly, which insensibly lengthen into pyramids of a beautiful red. These pyramids presently furrow themselves into flutings, which disengage from the summit, invert themselves all around, and present, by their expansion, very beautiful flowers formed of rays purple, yellow, and blue. By little and little, each of these flowers advances out of the cavity in which it is partly contained, and withdraws to some distance from the plant, remaining, however, attached to it, by a small filament. You then perceive each of the rays of which those flowers are com-

* Consult, with regard to the Valisneria, the Voyage of an anonymous English traveller, performed in the year 1750, to France, Italy, and the Islands of the Archipelago, in four small volumes, vol. i. It is stored with judicious observations of every kind. Consult likewise, respecting the genipa, and the different fruits, plants, and animals of southern countries, the sprightly Father *du Tertre*, the patriotic Father *Charlevoix*, *John de Laet*, the Historian, and all travellers who have written on the subject of Nature, without the spirit of system, assisted by the light of reason alone.

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posed, assume a motion peculiar itself, which communicates a circular movement to the water, and precipitates to the centre of each of them all the small bodies which are floating around. If those wonderful expansions are disturbed by any sudden shock, immediately every filament contracts, all the rays close, and all the pyramids retire into their cavities; for those pretended flowers are polypuses.

There are, in certain plants, parts which may be considered as characters of uncultivated Nature, but which are, like all the rest of her Works, evident proofs of the wisdom and providence of her AUTHOR; such are the prickles. Their forms are varied without end, especially in hot countries. Some are shaped like saws, like hooks, like needles, like the head of a halberd, and like caltrops. Some of them are round like awls, some triangular, like the shoemaker's piercer, and some flattened like a lancet. There is no less variety in their aggregations. Some are arranged on the leaves in balls, like those of the opuntia; others in stripes, like those of the Peruvian taper. Some are invisible, as those of the shrub of the Antilles, known by the name of captain's-wood. The leaves of this formidable plant, appear, on the upper side, smooth and shining; but they are covered, on the under side, with very delicate prickles, which

which are inserted in such a manner, that, apply your hand to them ever so cautiously, it is impossible to avoid pricking your fingers.

There are other thorns planted only on the stems of plants, others are on their branches. In our climates, they are scarcely ever to be found, except on shrubbery, and on a few trees; but in both Indies, they are scattered over a great many species of trees. Their very various forms and dispositions have relations, of which the greatest part are to us unknown, to the security and defence of the birds which live upon them. It was necessary that many of the trees of those countries should be armed with thorns, because many quadrupeds are there to be found, capable of climbing them, to eat the eggs and the young of birds, such as the monkey, the civet-cat, the tyger, the wild-cat, the musk-rat, the opossum, the wild rat, and even the common rat.

The Asiatic acacia * presents to it's winged inhabitants a retreat absolutely inaccessible to their enemies.

* There is a plant of the Asiatic acacia to be seen in that beautiful garden adjacent to the iron gate of Chaillot, which formerly belonged to the virtuous Chevalier de *Genfin*. As to the name of *false-acacia*, given to the acacia of America, I must observe, that Nature produces nothing false. She has given varieties

enemies. It bears no prickles on it's trunk, and in it's branches ; but at the height of ten or twelve feet, precisely at the place where the tree begins to branch off, there is a belt of several rows of large thorns, from ten to twelve inches in length, presenting an impenetrable rampart of spikes, nearly resembling the iron head of a halberd. The collar of the tree is encircled by it in such a manner, that it is impossible for any quadruped to get up. The acacia of America, improperly called the false-acacia, has it's prickles formed into hooks, and scattered over it's branches, undoubtedly from some unknown relation of opposition to the species of quadruped which makes war on the bird that inhabits it.

There are, in the Antilles Islands, trees which have no thorny prickles, but which are much more ingeniously protected than if they had. A plant known in those countries by the name of the prickly thistle, which is a species of creeping taper, attaches it's roots, similar to filaments, to the trunk of one of those trees, and runs to the ground all around it, to a considerable distance, crossing

rieties of all her productions, in all Countries, in order to bestow upon them relations adapted to the elements and to animals; and when we do not find in these the characters which we have assigned to them, the charge of falshood is not, in justice, to be fixed on her Works, but on our systems.

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it's branches one over another, and forming an inclosure of them, which no quadruped dares to approach. It likewise produces a fruit very grateful to the palate. On beholding a tree, the foliage of which is harmless, filled with birds that have there fixed their habitation, surrounded about the roots by one of those prickly thistles, and you are presented with the idea of one of those commercial defenceless cities, apparently accessible on every side, but protected all around by a citadel, encompassing it with extended intrenchments. Thus the tree is on one side, and it's thorn on the other.

Quadrupeds which live on the eggs of birds, would be reduced to great distress, did not Nature sometimes produce, on the summits of those very trees, a vegetable of very extraordinary form, which opens a passage to them. It is, in every respect, the opposite of the prickly thistle. It is a root of two feet in length, as thick as a man's leg, pricked, as if pierced with a bodkin, and adhering to a branch of the tree, by a multitude of filaments, somewhat in the same way that the prickly thistle is affixed to the under part of it's trunk. Like the other, it derives it's nourishment from the tree, and emits from ten to twelve great leaves, in form of a heart, of about three feet in length, and two feet in breadth, resembling the leaves of the nymphæa. Father *du Tertre* calls it the false-root of China.

What

What is still more extraordinary, it lets fall, from the top of the tree on which it is placed, in a perpendicular direction, very strong cordage, of the size of a quill, the whole length through, which takes root on reaching the ground. The plant itself emits no smell, but this cordage smells strongly of garlic. Undoubtedly, when a monkey, or some such clambering animal, perceives this broad standard of verdure, to no purpose does the tree oppose, around its root, a fortification of thorns, this signal announces that he has a friend within the fortress: the smell of the cordage, which descends down to the ground, directs him to the scaling ladder, even during the night; and while the birds are sleeping in security on their nests, confident in the strength of their bulwarks, the enemy gets possession of the town through the suburbs.

In those countries, the thorns upon the trees afford protection even to the insects. Bees there carry on their honey-making processes in the aged trunks of prickly trees, hollowed by the hand of Time. It is very remarkable that Nature, who has provided this resource for the bees of America, has withheld from them a sting, as if those on the trees were sufficient for their defence. I believe that to this reason it may be ascribed, though no attention has been paid to it, that we
have

have never hitherto been able to rear in the Antilles Islands, the honey-bees of the country. They refused, no doubt, to take up their abode in domestic hives, because they did not consider themselves as there in a state of security ; but might, perhaps, have been induced to make that choice, had the hives to which they were invited been decorated and defended by thorns.

If Nature employs prickly vegetables for the defence even of flies against the attacks of quadrupeds, she sometimes makes use of the same means for delivering quadrupeds from the persecution of common flies. She has, in truth, bestowed on those which are the most exposed to it, manes and tails, armed with long hair, to drive them away ; but the multiplication of those insects is so rapid in warm and humid seasons and countries, as to threaten destruction to the whole race of animals. One of the vegetable barriers, opposed to them by Nature, is the *dionæa muscipula*. This plant bears on one and the same branch, opposite little leaves, besmeared with a sugary liquor, resembling manna, and studded with very sharp prickles. When a fly perches on one of those little leaves, they instantly close with a spring, like the jaws of a wolf-trap, and the fly is spitted through and through.

There is another species of the *dionœa* which catches those insects with it's flower. When a fly attempts to extract it's nectareous juices, the corolla, which is tubulous, shuts at the collar, seizes the insect by the proboscis, and thus puts it to death. This plant is cultivated in the Royal Garden. It is observable, that it's cup-formed flower is white, radiated with red, and that these two colours universally attract flies, from their natural avidity of milk and of blood.

There are aquatic plants, armed with thorns, proper for catching fishes. You may see in the Royal Garden, an American plant, called *martinia*, the flower of which has a very agreeable odour, and which, from the form of it's rounded leaves, the sleekness of their tails and of their stems, has all the aquatic characters which have been indicated. It has this farther character peculiar to itself, that it transpires so copiously as to appear to the touch in a state of continual humidity. I can have no doubt, therefore, that this plant grows in America on the brink of the water. But the shell which envelops it's seeds possesses a very extraordinary nautical character. It resembles a fish half dried; white and black, with a long fin upon the back. The tail of this fish is drawn out into great length, and terminates in a very sharp point, bent into the form of a fish-hook. This tail usually
separates

separates into two, and thus presents a double hook. The configuration of this vegetable fish is completely similar in size, and in form, to the hook which is employed at sea for catching goldneys, and at the head of which is figured, in linen, a flying-fish, with this exception, that the goldney-hook has but one curve and barb, whereas the shell of the martinia has two, which must render it's effect more infallible. This shell contains several black seeds, shrivelled, and similar to the globules of the sheep's dung flattened.

As I possess but few books on Botany, I did not know of what country the martinia was a native; but having lately consulted the Work of *Linnaeus*, I find that we got it from Vera-Cruz. The celebrated Naturalist, whom I have just mentioned, discovers, in this shell, no resemblance but that of a woodcock's head; but had he ever seen the hook for goldneys, he could not possibly have hesitated about preferring this similitude, in the appearance, in as much as the extremity of this pretended beak bends back into two hooks, which prick like needles, and are, as well as the whole shell, and the tail, by which it is united to the stem, of a ligneous and horny substance, not easily broken asunder. *John de Laet* * tells us, that the land of

* History of the West-Indies, book v. chap. 18.

Vera-Cruz is on a level with the Sea, and that it's port, called *St. John de Hulloa*, is formed by a small island, no higher than the water; so that, says he, when the tide rises very high, the land wholly disappears.

Such inundations are very common at the bottom of the Gulf of Mexico, as we learn from the relation which *Dampier* has given us of the Bay of Campechy, which is in that vicinity. Hence I presume, that the martinia, which grows on the inundated shores of Vera-Cruz, has certain relations, which we know nothing of, to the fishes of the Sea; in as much as the seeds of several trees and plants of those countries, described by *John de Laet*, possess very curious nautical forms. A drawing of the martinia, taken from Nature, is presented fronting page 191 of this Volume.

But there is no occasion to resort to foreign plants, for ascertaining the existence of vegetable relations to animal. The bramble, which affords, in every field through which we pass, a shelter to so many birds, has it's prickles formed into hooks; so that it not only prevents the cattle from disturbing the bird's retirement, but frequently lays them under contribution for a flake of wool or hair, proper for finishing off their nests, as a reprisal for hostility committed, and an indemnification for damages

damages sustained. *Pliny* alleges, that this gave rise to the pretended animosity between the linnet and the ass. This quadruped, whose palate is proof against thorns, frequently browses on the shrub in which the linnet builds her nest. She is so terrified at his voice, that on hearing it, says, he, she kicks down her eggs; and her callow brood die with terror of it. But she makes war upon him, in her turn, by fixing her attack on the scratches made in his hide by the prickles, and picking the flesh, in those tender parts, to the very bone. It must be a very amusing spectacle to view the combat between the little and melodious songster, and the dull, braying, but otherwise inoffensive, animal.

Did we know the animal relations of plants, we should possess sources of intelligence respecting the instincts of the brute creation, with which we are totally unacquainted. We should know the origin of their friendships, and of their animosities, at least as to those which are formed in society; for with regard to such as are innate, I do not believe that the cause of them was ever revealed to any man. These are of a different order, and belong to another world. How should so many animals have entered into life, under the dominion of hatred, without having been offended; furnished with skill and industry, without having served an

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apprentice.

apprenticeship; and directed by an instinct more infallible than experience? How came the electrical power to be conferred on the torpedo, invisibility on theameleon, and the light of the stars themselves on a fly? Who taught the aquatic-bug to slide along the waters, and another species of the same denomination to swim upon the back; both the one and the other for catching their prey, which hovers along the surface? The water-spider is still more ingenious. She incloses a bubble of air in a contexture of filaments, takes her station in the middle, and plunges to the bottom of the brook, where the air-bubble appears like a globule of quick-silver. There, she expatiates under the shade of the nymphæa, exempted from the dread of every foe. If, in this species, two individuals, different in sex, happen to meet, and to suit each other, the two globules, being in a state of approximation, become united into one, and the two insects are in the same atmosphere. The Romans, who constructed on the shores of Baiæ, saloons underneath the waves of the Sea, in order to enjoy the coolness, and the murmuring noise of the waters, during the heats of Summer, were less dexterous, and less voluptuous. If a man united in himself those marvellous faculties which are the portion of insects, he would pass for a god with his fellow-creatures.

It is of importance for us to be acquainted with, at least, such insects as destroy those which are offensive to Man. We might turn their mutual hostility to good account, by converting it into the means of our own repose. The spider catches the flies in nets; the formicaléo surprizes the ants in a tunnel of sand; the four-winged ichneumon seizes the butterflies on the wing. There is another ichneumon, so small and so cunning, that it lays an egg in the anus of the vine-fretter. Man has it in his power to multiply at pleasure the families of insects which are useful to him; and may find means of diminishing such as make depredations on his agricultural possessions. The small birds of our groves tender him, to the same effect, services of still greater extent, and accompanied with other circumstances inexpressibly agreeable. They are all directed by instinct to live in his vicinity, and about the pastures and habitations of his flocks and herds. A single species of them might frequently be sufficient to protect the cattle from the insects which infest them through the Summer.

There is in the North a gadfly, called *Kourbma* by the Laplanders, and by the Learned, *æstrus rangiferinus*, which torments the domestic reindeer to such a degree as to force them in agony to the mountains, and sometimes actually plague them to death, by depositing their eggs in the skin

of the animal. Many dissertations have, as the custom is, been composed on this subject, but no remedy for the evil has been proposed. I am convinced there must be birds in Lapland, which would deliver the rein-deer from this formidable insect, did not the Laplanders terrify them away by the noise of their fowling-pieces. These arms of civilized Nations have overspread with barbarism all our plains. The birds, destined to embellish the habitation of Man, withdraw from it, or approach with timidity and mistrust. The sound of musquetry ought to be prohibited, at least, around the haunts of the harmless cattle. When the birds are not scared away by the fowler, they follow their instincts.

I have frequently seen in the Isle of France, a species of starling, called martin, imported thither from India, perch familiarly on the back and horns of the oxen, to pick them clean. To this bird that island stands indebted, at the present day, for the destruction of the locusts, which, in former times, committed such ravages upon it. In those of our European rural scenes which still exhibit, on the part of Man, some degree of hospitality toward the innocent warblers, he has the pleasure of seeing the stork build her nest on the ridge of his house; the swallow flutter about in his apartments: and the wagtail, along the bank of the river,

river, frisk around his sheep, to protect them from the gnats.

The foundation of all this variety of pleasant and useful knowledge is laid in the study of plants. Each of them is the focus of the life of animals, the species of which there collect in a point, as the rays of a circle at their centre.

As soon as the Sun, arrived in his annual progression, at the sign of the Ram, has given the signal of Spring to our Hemisphere, the rainy and warm wind of the South takes it's departure from Africa, swells the Seas, elevates the rivers above their banks, so that they inundate the adjacent plains, and fatten them with their fertilizing slime; and levels, in the forests, the aged trees, the decayed trunks, and every thing that presents an obstacle to future vegetation. It melts the snows which cover our fields, and forcing it's way to the very Pole, it breaks to pieces, and dissolves the enormous masses of ice which Winter had there accumulated. When this revolution, known all over the Globe by the name of the equinoctial gale, has taken place, in the month of March, the Sun revolves night and day around our Pole, so that there is not a single point, in the whole northern Hemisphere, that can escape his heat.

Every

Every step he advances in his course through the Heavens, a new plant makes it's appearance on the Earth. Each of them arises in succession, and occupies it's proper station at the hour assigned to it; at one and the same instant it receives the light in it's flowers, and the dew of Heaven on it's foliage. In proportion to it's progress in growth, the different insect-tribes which thence derive their nourishment, likewise display their existence, and unfold their characters. At this epocha, too, each species of bird resorts to the species of plant with which she is acquainted, there to build her nest, and to feed her young with the animal prey which it presents to her, to supply the want of the seeds which it has not as yet produced. We presently behold the tribes of birds of passage flock thither, in quest of the portion which Nature has provided for them likewise. First comes the swallow, to preserve our habitations from the vermin, by planting her nest around us. The quail forsakes Africa, and grazing the billows of the Mediterranean, and in troops innumerable, is scattered over the boundless meadows of the Ukraine. The heathcock pursues his course northward as far as Lapland. The wild ducks and geese, the silvery swans, forming long triangular squadrons in the air, advance to the very islands adjacent to the Pole. The stork, in former times adored in Egypt, which she abandons,

dons, crosses over Europe, halting here and there to take repose, even in great cities, on the roofs of the houses of hospitable Germany. All these birds feed their young on the insects and reptiles which the newly expanded plants have fostered into life.

Then, too, it is that the fishes issue in legions, from the northern abysses of the Ocean, allured to the mouths of rivers by clouds of insects, which are confined entirely to their waters, or expand into life along their banks. They stem the watery current in shoals, and advance, skipping and springing, up to the very sources of the stream; others, as the north-capers, suffer themselves to be swept into the general current of the Atlantic Ocean, and appear, in form of a ship's bottom, on the coasts of Brasil, and on those of Guinea.

Quadrupeds themselves, likewise, then undertake long peregrinations. Some proceed from the South to the North, with the Sun; others from East to West. There are some which coast along the rugged chains of mountains; others, follow the courses of rivers which have never been navigated. Lengthened columns of black cattle pasture, in America, along the banks of the Méchassipi, which they cause to resound with their bellowing. Numerous squadrons of horses traverse the rivers and the deserts of Tartary; and wild
sheep

sheep stray bleating amidst it's vast solitudes. These flocks have neither overseer nor shepherd to guide them through the desert, to the music of the pipe; but the expansion of herbage which they know, determines the moment of their departure, and the limits of their progress. It is then that each animal inhabits his natural situation, and reposes under the shade of the vegetable of his fathers. It is then that the chains of harmony exert all their force, and that all, being animated by consonances, or by contrasts, the air, the waters, the forests, and the rocks, seem to be vocal, to be impassioned, to be transported with delight.

But this vast concert can be comprehended by celestial Intelligences only. To Man it is sufficient, in order to study Nature with advantage, that he limit his researches to the study of one single vegetable. It would be necessary, for this purpose, to make choice of an aged tree, in some solitary situation. From the characters which have been indicated, a judgment might easily be formed, whether it be in it's natural position; but still better from it's beauty, and from the accessories which Nature uniformly places in connection with it, where the hand of Man has not interposed to derange the operations. The student would first observe it's elementary relations, and the striking characters which distinguish the different

rent species of the same genus, some of which grow at the sources of rivers, and others at the place of their discharge into the Ocean. He would afterwards examine its convolvuluses, its mosses, its mistletoes, its scolopendræ, the mushrooms of its roots, nay, the very grasses which grow under its shade. He would perceive, in each of its vegetables, new elementary relations, adapted to the places which they occupy, and to the tree which sustains, or shelters them.

His attention might next be directed to the various species of animals which resort to it as a habitation, and he would presently be convinced, that, from the snail up to the squirrel, there is not a single one, but what has determinate and characteristic relations to the dependancies of its vegetation.

If the tree in question were growing in a forest, itself too of considerable antiquity, it would, most probably, have, in its vicinity, the tree which Nature designed should contrast with it in the same site, as, for example, the birch with the fir. It is farther probable, that the accessory vegetables and animals of this last, would, in like manner, form a contrast with those of the first. These two spheres of observation would mutually illuminate each other, and would diffuse the clearest light
over

over the manners of the animals which frequent them. We should then have a complete chapter of that immense and sublime History of Nature, the alphabet of which is hitherto unknown to us.

I am fully convinced, that without fatigue, and almost without any trouble, discoveries the most curious might be made; were we to restrict our enquiries but to one single compartment, we should discover a multitude of the most enchanting harmonies. In order to enjoy some imperfect sketches of this kind, we must have recourse to travellers. Our Ornithologists, fettered by methods and system, only think of swelling their catalogue, and distinguish nothing in birds save the feet and the bill. It is not in the nests that they observe them, but in hunting, and in their pouch. They even consider the colours of their plumage as accidents. It was not by chance, however, that Nature, on the shores of Brasil, bestowed a beautiful carnation colour, with a border of black, on the extremity of the wings of the *Ouara*, a species of curlew, which inhabits the sea-green foliage of the *paletuvier*, which grows in the bosom of the waves, and bears no apparent flowers. The *favia*, another bird of the same climate, is yellow over the belly, with the rest of the plumage gray. It is about the size of a sparrow, and perches on the pepper plant, the flowers of which have no lustre,

lustre, but whose grains are eaten by this bird, and re sown wherever she takes her flight.

To those correspondences must be joined such as pertain to site, which itself derives so much beauty from the overshadowing vegetable. These harmonies are detailed by Father *Francis d'Abbeville*. If credit is to be given to the *History of Voyages* by the Abbé *Prevost*, there is, on the banks of the Senegal, a fluviatic tree, the leaves of which are thorny, and the branches pendant, in form of an arch. It serves as a habitation to birds called kurbalos, or fishers, of the size of a sparrow, variously coloured. Their bill is very long, and armed with little teeth, resembling a saw. They build a nest of the bulk of a pear, composed of earth, feathers, straw, moss, and attach it to a long thread, suspended from the extremity of the branches which project over the river, in order to secure it from the serpents and monkeys, which sometimes contrive to clamber up after them. You would take those nests, at a little distance, for the fruit of the tree: and some of those trees contain to the number of a thousand. You perceive the kurbalos fluttering incessantly along the water, and entering into their nests with a motion that dazzles the eyes.

According

According to Father *Gharlevoix*, there grows in Virginia, on the brink of the lakes, a laurel-leaved yew-tree, which pushes several stems from its root, the branches of which embrace all the surrounding trees, and climb to the height of more than sixteen feet. They form, in Summer, an impenetrable shade, and in Winter a temperate retreat for the birds. Its flowers have no very striking appearance, and its fruit grows in round clusters, loaded with black grains. This yew has for its principal inhabitant, a very beautiful kind of jay. The head of that bird is adorned with a long black crest, which it can erect at pleasure. Its back is of a deep purple. The wings are black on the inside, blue externally, and white at the extremities, with white stripes across every feather. Its tail is blue, and marked with the same stripes as the wings; and its cry is far from being disagreeable.

There are birds which lodge not upon their favourite plant, but opposite to it. Such is the colibri, which frequently nestles, in the Antilles Islands, on the straw which thatches a cottage, in order to live under the protection of Man. In our climates, the nightingale constructs his nest under covert of a bush, choosing, in preference, such situations as repeat an echo, and carefully observing to expose it to the morning sun. Having employed such precautions, he takes his station in the vicinity,

vicinity, against the trunk of a tree; and there, confounded with the colour of it's bark, and motionless, he becomes invisible. But he presently animates the obscure retreat which he has chosen, by the divine melody of his song, and effaces all the brilliancy of plumage, by the charms of his music.

But whatever enchantment may be diffused by plants and animals over the situations which have been assigned to them by Nature, I never can consider a landscape as possessing all it's beauty, unless I perceive in it, at least, one little hut. The habitation of Man confers, on every species of vegetable, a new degree of interest or of majesty. Nothing more is necessary, in many cases, than a tree, in order to characterize, in a country, the wants of whole Nation, and the care of Providence. I love to see the family of an Arab under the date-tree of the desert, and the boat of an islander of the Maldivias loaded with cocoa-nuts, under the cocoa-trees of their gravelly strands. The hovel of a poor un-industrious Negro gives me pleasure, under the shade of a great gourd-plant, which exhibits his complete set of household furniture. Our magnificent hotels, in great cities, are the habitations of tradesmen merely: in the country, they are transformed into castles, palaces, temples. The long avenues which announce them confound themselves

themselves with those which form the communication of empires. This is not, in truth, what I consider as most interesting in rural scenery. To the most ostentatious exhibition of splendor, I have frequently preferred the view of a little hamlet of fishermen, built by the side of a river. With inexpressible delight have I sometimes reposed, under the shade of the willows, and of the poplars, on which were suspended the bow-nets, composed of their own branches.

I shall now proceed, in my usual superficial manner, to take a rapid glance of the harmonies of plants with Man; and, in order to introduce, at least, something of order into a subject so rich in matter, I shall farther divide those harmonies, relatively to Man himself, into *elementary*, into *vegetable*, into *animal*, and into *human*, properly so called, or *alimentary*.

HUMAN HARMONIES OF PLANTS.

Elementary Harmonies of Plants relatively to Man.

If we consider the vegetable Order under the simple relations of strength and magnitude, we shall find it divided, with a sufficient degree of generality, into three great classes, namely, into herbs, into shrubs, and into trees. It is to be remarked, in the first place, that herbs are of a substance pliant and soft. Had they been ligneous and hard, like the young boughs of trees, to which it might appear they ought naturally to have a resemblance, as they grow on the same soil; the greatest part of the Earth would have been inaccessible to the foot of Man, till the fire, or the hatchet, had cleared the way for him. It was not by chance, therefore, that so many grasses, mosses, and herbs, assumed a soft and yielding texture, nor from want of nourishment, nor of the means of expansion; for some of those herbs rise to a very great height, such as the banana of India, and several ferulaceous plants of our own climates, which attain the stature of a little tree.

On the other hand, there are ligneous shrubs, which do not exceed the generality of herbs in
U 2 height;

height ; but they grow, for the most part, on rugged and steep places, affording to Man the means of clambering up with facility, for they shoot out of the very clefts of the rocks. But as there are rocks which have no clefts, and which present the perpendicularity of a wall, there are likewise creeping plants which take root at their bases, and which, fixing themselves to their sides, rise in close cohesion to a height surpassing that of many of the tallest trees : such are the ivy, the virgin-vine, and a great number of the *lianne* tribe, which mantle along the rocks of southern regions.

Were the Earth covered with vegetables of this sort, it would be impossible to walk over it. It is very remarkable, that when uninhabited islands were discovered, some were found clothed with forests, as the Island of Madeira ; others in which there was nothing but herbage and rushes, as the Malouine Islands, at the entrance of Magellan's Strait ; others carpeted with mosses simply, such as several little isles on the coast of Spitzbergen ; others, in great number, on which these several vegetables were blended ; but I do not know of a single one which was found to contain only shrubbery and liannes. Nature has placed this class only on places not easily to be scaled, in order to facilitate access to Man. It may be affirmed, that

no precipice presents a surface so perpendicular as to be insurmountable, with their assistance. Thus aided, the ancient Gauls were on the point of storming the capitol.

As to trees, though they are replenished with a vegetative force, which elevates them to a very considerable height, the greater part of them do not send out their first branches but at a certain distance from the ground. So that though they form, when they have attained a certain degree of elevation, an intertexture impenetrable to the Sun, which they extend to a great distance around, they leave, however; about their roots, avenues sufficient to render them accessible, so that the forests may be traversed with ease and expedition.

Such, then, are the general dispositions of vegetables upon the Earth, relatively to the occasion which Man had to range over it. The herbage serves as a carpet to his feet; the shrubbery as a scaling ladder to his hands; and the trees are as so many parasols over his head. Nature, after having established those proportions between them, has distributed them in all the varieties of situation, by bestowing on them, abstractedly from their particular relations to the elements, and to the animal creation, qualities the best adapted to minister to the necessities of Man, and to com-

penfate, in his favour, the inconveniences of climate.

Though this manner of ftudying her Works be now held in contempt by moft Naturalifts, to it, however, fhall our researches be limited. We have juft been confidering plants according to their fhape and fize, after the manner of gardeners; we proceed farther to examine them as is done by the wood-feller, the huntsman, the carpenter, the fifherman, the fhepherd, the failor, nay, the nofe-gay-maker. It is of fmall importance whether we are learned, provided we ceafe not to be men.

It is in the countries of the North, and on the fummit of cold mountains, that the pine grows, and the fir, and the cedar, and moft part of refinous trees, which fhelter man from the fnows by the closenefs of their foliage, and which furnifh him, during the Winter feafon, with torches, and fuel for his fire-fide. It is very remarkable, that the leaves of thofe ever-green trees are filiform, and extremely adapted, by this configuration, which poffeffes the farther advantage of reverberating the heat, like the hair of animals, for refiftance to the impetuofity of the winds, that beat with peculiar violence on elevated ftuations. The Swedifh Naturalifts have obferved, that the fatteft pines are to be found on the dryeft and moft fand regions

regions of Norway. The larch, which takes equal pleasure in the cold mountains, has a very resinous trunk.

Mathiola, in his useful commentary on *Dioscorides*, informs us, that there is no substance more proper than the charcoal of these trees, for promptly melting the iron minerals, in the vicinity of which they peculiarly thrive. They are, besides, loaded with mosses, some species of which catch fire from the slightest spark. He relates, that being obliged, on a certain occasion, to pass the night in the lofty mountains of the Strait of Trento, where he was botanizing, he found there a great quantity of larches (*larix*) bearded all over, to use his own expression, and completely whitened with moss. The shepherds of the place, willing to amuse him, set fire to the mosses of some of those trees, which was immediately communicated with the rapidity of gunpowder touched with the match. Amidst the obscurity of the night, the flame and the sparks seemed to ascend up to the very Heavens. They diffused, as they burnt, a very agreeable perfume. He farther remarks, that the best agaricum grows upon the larch, and that the arquebusers of his time made use of it for keeping up fire, and for making matches. Thus Nature, in crowning the summit of cold and ferruginous mountains with those vast vegetable torches, has placed the match

in their branches, the tinder at their foot, and the steel at their roots.

To the South, on the contrary, trees present, in their foliage, fans, umbrellas, parasols. The latanier carries each of it's leaves plaited as a fan, attached to a long tail, and similar, when completely displayed, to a radiating Sun of verdure. Two of those trees are to be seen in the Royal-Garden. The leaf of the banana resembles a long and broad girdle, which, undoubtedly, procured for it the name of Adam's fig-tree. The magnitude of the leaves of several species of trees increases in proportion as we approach the Line. That of the cocoa-tree, with double fruit, of the Sechelles Islands, is from twelve to fifteen feet long, and from seven to eight broad. A single one is sufficient to cover a numerous family. One of those leaves is, likewise, to be seen in the Royal Cabinet of Natural History. That of the talipot of the Island of Ceylon is of nearly the same size.

The interesting and unfortunate *Robert Knox*, who has given the best account of Ceylon which I am acquainted with, tells us, that one of the leaves of the talipot is capable of covering from fifteen to twenty persons. When it is dry, continues he, it is at once strong and pliant, so that you may fold and unfold it at pleasure, being naturally
plaited

plaited like a fan. In this state it is not bigger than a man's arm, and extremely light. The natives cut it into triangles, though it is naturally round, and each of them carries one of those sections over his head, holding the angular part before, in his hand, to open for himself a passage through the bushes. The soldiers employ this leaf as a covering to their tents. He considers it, and with good reason, as one of the greatest blessings of Providence, in a country burnt up by the Sun, and inundated by the rains, for six months of the year.

Nature has provided, in those climates, parasols for whole villages; for the fig-tree, denominated, in India, the fig-tree of the Banians, a drawing of which may be seen in *Tavernier*, and in several other travellers, grows on the very burning sand of the sea-shore, throwing, from the extremity of its branches, a multitude of shoots, which drop to the ground, there take root, and form, around the principal trunk, a great number of covered arcades, whose shade is impervious to the rays of the Sun.

In our temperate climates, we experience a similar benevolence on the part of Nature. In the warm and thirsty season, she bestows upon us a variety of fruits, replenished with the most refreshing
juices,

juices, such as cherries, peaches, melons; and, as Winter approaches, those which warm and comfort by their oils, such as the almond and the walnut. Certain Naturalists have considered even the ligneous shells of these fruits, as a preservative against the cold of the gloomy season; but these are, as we have seen, the means of floating and of navigating. Nature employs others, with which we are not acquainted, for preserving the substances of fruits, from the impressions of the air. For example, she preserves, through the whole Winter, many species of apples and pears, which have no other covering than a pellicle so very thin, that it is impossible to determine how fine it is.

Nature has placed other vegetables in humid and in dry situations, the qualities of which are inexplicable on the principles of our Physics, but which admirably harmonize with the necessities of the men who inhabit those places. Along the water-side grow the plants and the trees which are the driest, the lightest, and, consequently, the best adapted to the purpose of crossing the stream. Such are reeds, which are hollow, and rushes, which are filled with an inflammable marrow. It requires but a very moderate bundle of rushes to bear the weight of a very heavy man upon the water. On the banks of the lakes of the North are produced those enormous birch-trees, the bark of a single
one

one of which is sufficient to form a large canoe. This bark is similar to leather in pliancy, and so incorruptible by humidity, that, in Russia, I have seen some of it extracted from under the earth which covered powder magazines, perfectly sound, though it had lain there from the time of *Peter the Great*.

If we may depend on the testimony of *Pliny* and of *Plutarch*, there were found at Rome, four hundred years after the death of *Numa*, the books which that great King had commanded to be deposited with his body in the tomb. The body was entirely consumed; but the books, which treated of Philosophy and Religion, were in such a state of preservation, that *Petilius*, the Pretor, undertook to read them, by command of the Senate. On the report which he made respecting their contents, they were ordered to be burnt. They were written on the bark of the birch-tree. This bark consists of an accumulation of ten or twelve sheets, white and thin, like paper, the place of which it supplied to the ancients.

Nature presents to Man different trajectiles on different shores. She has planted, on the banks of the rivers of India, the bamboo, an enormous reed, which rises there sometimes to the height of sixty feet, and swells to the size of a man's thigh.
The

The part comprehended between two of it's joints is sufficient to bear a man up on the water. The Indian places himself upon it a-straddle, and so crosses a river, swimming along by the motion of his feet. The Dutch Navigator, *John Hugo de Linschotten*, an author of reputation, assures us that the crocodile never touches persons who are passing rivers in this manner, though he frequently attacks canoes, and even the boats of Europeans. *Linschotten* ascribes the abstinence of this voracious animal to an antipathy which he has to that species of reed.

Francis Pyrard, another traveller, who has observed Nature with a careful eye, informs us, that there grows, on the shores of the Maldivia Islands, a tree called *candou*, the wood of which is so light, that it serves as cork for the fishermen *. I think I was once possessed of a log of wood of that species. It was stripped of the bark, perfectly white, of the thickness of my arm, about six feet long, and so light, that I could easily lift it by my finger and thumb. In these same islands, and on the same strands, rises the cocoa-tree, which there attains a higher degree of beauty than any where else in the World. Thus, the tree of all others most useful to mariners, grows on the shores of the Seas

* See *Pyrard's Voyage to the Maldivia Islands*, page 38.

most frequented by men of that description. All the world knows that the vessel is there constructed of it's timber, that it's leaves are formed into sails, that the trunk serves for a mast, that the hempen substance called *caira*, which surrounds it's fruit, is wrought into cordage, and when the whole is ready for sea, a cargo of cocoa-nuts is the lading. It is farther remarkable, that the cocoa-nut, before it comes to perfect maturity, contains a liquor which is an excellent antiscorbutic.

Is it not, then, a miracle of Nature, that this fruit, replenished with such milk, should come to perfection on the barren strand, and within the washing of the briny Deep? Nay, it is only on the brink of the Sea, that the tree which bears it arrives at it's highest beauty; for few are to be seen in the interior of countries.

Nature has placed a palm-tree of the same family, but of a different species, on the summit of the mountains of the same climates: it is the palmist. The stem of this tree is sometimes above a hundred feet high, is perfectly straight, and bears on it's summit, all the foliage which it has, a bunch of palms, from the midst of which issues a long roll of plaited leaves, resembling the staff of a lance. This roll contains, in a sort of coriaceous sheath, leaves ready to shoot, which are very
good

good eating before their expansion. The trunk of the palmist is woody only at the circumference, and it is so hard as to resist the edge of the best tempered hatchet. It may be cleft, with the utmost ease, from end to end, and is filled, inwardly, with a spongy substance, which may be easily separated. Thus prepared, it serves to form, for conducting waters, frequently diverted from their course by the rocks which are at the summit of mountains, tubes which are not corruptible by humidity. Thus the palm-tree gives to the inhabitants of those regions the means of constructing aqueducts at the source of rivers, and ships at the place of their discharge.

Other species of trees render them the same services, in other situations. On the shores of the Antilles Islands grows the *acajou*, there called, but improperly, the cedar, on account of its incorruptibility. It arrives at such a prodigious size, that out of one log of it they make a boat capable of carrying so many as forty men*. This tree possesses another quality, which, in the judgment of the best observers, ought to render it invaluable for the marine service; namely this, that it is the only one, of those shores, which is never attacked by the sea-worm, an insect so formidable to every

* Consult Fathers *Labat* and *Du Tertre*.

other species of timber which floats in those seas, that it devours whole squadrons in a very little time, and, in order to preserve them, lays us under the necessity, these many years past, of sheathing their bottoms with copper. But this beautiful tree has found enemies more dreadful than the worm, in the European inhabitants of those Islands, who have almost extirpated the whole race of them.

The manner in which Providence has contrived a supply for the thirst of Man, in sultry places, is no less worthy of admiration. Nature has placed, amidst the burning sands of Africa, a plant whose leaf, twisted round like a cruet, is always filled with a large glass-full of fresh-water; the gullet of this cruet is shut by the extremity of the leaf itself, so as to prevent the water from evaporating. She has planted on some parched districts of the same country, a great tree, called by the Negroes *Boa*. the trunk of which, of a prodigious bulk, is naturally hollowed like a cistern. In the rainy season it receives it's fill of water, which continues fresh and cool, in the greatest heats, by means of the tufted foliage which crowns it's summit. Finally, she has placed vegetable fountains on the parched rocks of the Antilles. There is commonly found there a lianne, called the water lianne, so full of sap, that if you cut a single branch of it, as much
water

water is immediately discharged as a man can drink at a draught: it is perfectly pure and limpid.

In the swamps of the Bay of Campeachy, travellers find relief of another kind. Those swamps, on a level with the Sea, are almost entirely inundated in the rainy season, and become so parched on the return of dry weather, that many huntsmen who had happened to miss their way in the forests, with which they are covered, actually perished with thirst. The celebrated traveller *Dampier* relates, that he several times escaped this calamity, by means of a very extraordinary species of vegetation, which had been pointed out to him on the trunk of a kind of pine very common there; it resembles a packet of leaves, piled one over another in tiers; and, on account of its form, and of the tree on which it grows, he calls it the pine-apple. This apple is full of water, so that on piercing it at the basis with a knife, there immediately flows from it a good pint of very clear and wholesome water. Father *du Tertre* informs us, that he has several times found a similar refreshment in the leaves, rounded like a cornet, of a species of balizier, which grows on the sandy plains of Guadaloupe. I have been assured by many of our sportsmen, that nothing was more proper for the quenching of thirst than the leaves of the mistletoe, which grows on many trees.

Such

Such are, in part, the precautions employed by Providence for compensating, in favour of Man, the inconveniencies of every climate; by opposing to the qualities of the elements, contrary qualities in vegetables. I shall pursue them no farther, for I believe the subject to be inexhaustible. I am persuaded, that every Latitude, and every season, has it's own, which are appropriated to it, and that every parallel varies them in every degree of Longitude.

Vegetable Harmonies of Plants with Man.

Were we now to examine the vegetable relations of plants to Man, we should find them to be infinite in number; they are the perpetual sources of our arts, of our manufactures, of our commerce, and of our enjoyments; but, in our usual way, we shall just run over a few of their natural and direct relations, with which Man has intermingled nothing of his own.

To begin with their perfumes, Man appears to me the only being, endowed with sensibility, who is affected by these. Animals, it is granted, and especially bees and butterflies, have certain plants proper to themselves, which attract or repel them by their emanations; but these affections

seem to be connected with their necessities. Man alone is sensible to the perfume and lustre of flowers, independantly of all animal appetite. The dog himself, who, from his domestic habits, assumes so powerful a tincture of the manners and of the tastes of Man, appears totally insensible to that enjoyment. The impression which flowers make upon us, seems connected with some moral affection; for there are some which enliven us, whereas others dispose us to melancholy, without our being able to assign any other reasons for it than those which I have endeavoured to unfold, in examining some general Laws of Nature.

Instead of distinguishing them as yellow, red, blue, violet, we might divide them into gay, into serious, into melancholy: their character is so expressive, that lovers, in the East, employ their shades to describe the different degrees of their passion. Nature makes frequent use of it, relatively to us, with the same intention. When she wants to keep us at a distance from a marshy and unwholesome place, she scatters there poisonous plants, which present dingy colours, and offensive smells. There is a species of arum, which grows in the morasses of Magellan's Strait, whose flower exhibits the appearance of an ulcer, and exhales an odour so strong of putrid flesh, that the flesh-fly resorts to it to deposit her eggs.

But

But the number of fetid plants is of no great extent. The Earth is clothed with flowers which, for the most part, have very pleasing hues and perfumes. I wish time would permit me to say something of the simple aggregation of flowers. This subject is so vast, and so rich, that I hesitate not to affirm, that it presents ample employment for the most famous Botanist in Europe, through his whole life, by discovering to him every day some new beauty, and that without removing above a league from his own habitation. All the art with which jewellers dispose their gems disappears before that which Nature displays in the assortment of flowers.

I shewed *J. J. Rousseau* the flowers of different trefoils, which I had picked up, as I was walking with him: some of them were disposed in crowns, in half-crowns, in ears, in sheaves, with colours endlessly varied. While they were yet on their stems, they had besides other aggregations, with the plants which were frequently opposed to them, in colours and in forms. I asked him, whether Botanists gave themselves any trouble about those harmonies: he told me no; but that he had advised a young Painter, of Lyons, to learn Botany, with a particular view to study in it the forms and the assemblages of flowers; and that he had thus become one of the most celebrated pattern-drawers in Eu-

rope. On this subject, I quoted to him a passage from *Pliny*, with which he was highly delighted : it relates to a Painter of Sicyon, named *Pausias*, who learned, by means of this study, to paint flowers at least as well as he of Lyons knew how to draw them : he had, in truth, a master as skilful as Nature herself, or rather one and the same with her, namely, Love.

I shall give this story in the simplicity of style of the old Translator of *Pliny*, in order to preserve all it's vivacity *. “ In his youth he became enamoured of a nosegay girl, of the same city with himself; her name was *Glycera*; she was very pretty, and had a singularly elegant taste in assorting, a thousand different ways, the flowers of nosegays and chaplets; so that *Pausias*, copying after Nature the chaplets and nosegays of his mistress, rendered himself, at length, perfect in that art. Last of all, he painted her seated, in the action of composing a chaplet of flowers; and this picture is considered as his great masterpiece : he called it *Stephano-Plocos*, the garland-weaver, because *Glycera* had no other means of relieving the pressure of poverty, but making and selling garlands and nosegays. And it is confidently affirmed, that *L. Lucullus* gave to

* *Pliny's Natural History*, book xxxv. chap. ii.

“ *Dionysius*,

“ *Dionysius*, of Athens, two talents, for a simple
“ copy of this picture.”

This anecdote must have been singularly pleasing to *Pliny*, for he has repeated it in another place * : “ Those of Peloponesus,” says he, “ were
“ the first who regulated the colours and the
“ smells of the flowers of which chaplets were
“ composed. It was, however, originally the invention of *Pausias*, a Painter, and of a nosegay-girl, named *Glycera*, with whom he was violently in love ; whence he was engaged to imitate to the life the chaplets and nosegays which she composed. But the girl varied in so many
“ ways the arrangement of the flowers of her chaplets, in order to teize and employ her lover, that
“ it afforded very high amusement to behold the
“ skill of the Painter *Pausias*, and the natural production of *Glycera*, striving for the superiority.”

Ancient Nature is still better acquainted with the subject, than is the young *Glycera*. As it is impossible to follow her in her infinite variety, we shall make, at least, one observation respecting her regularity. It is this, that there is not any one odoriferous flower, but what grows at the foot of Man, or at least within reach of his hand. All

* *Idem*, book xxi. chap. 2.

those of this description are placed on herbage, or on shrubbery, as the heliotrope, the pink, the gillyflower, the violet, the rose, the lilach. Nothing similar to these grows on the lofty trees of our forests; and if some flowers of brilliant appearance are displayed on certain tall trees of foreign countries, such as the tulip-tree, and the great chestnut of India, they have no very pleasant smell. Some trees of India, it is admitted, as the spice-bearing plants, are perfumed all over; but their flowers are not very showy, and do not partake of the odour of their leaves. The flowers of the cinnamon tree smell like human excrement: this I know to be true by experience; if, however, the trees which were shewed to me in the Isle of France, in a plantation belonging to Mr. *Magon*, were the real cinnamon. The beautiful and fragrant flower of the magnolia grows on the lower part of the plant. Besides, the laurel which bears it is, as well as spice-trees, a plant of no great elevation.

It is possible I may be mistaken in some of my observations; but supposing them multiplied, with respect to the same object, and attested by persons of veracity, and exempted from the spirit of system, I am able to deduce general consequences from them, which ought not to be a matter of indifference to the happiness of Mankind, by demonstrating

monstrating to him the invariable intentions of benevolence in the AUTHOR of Nature. The varieties of their adaptation reflect mutual light; the means are different, but the end is constantly the same. The same goodness which has placed the fruit destined for the nourishment of Man, within reach of his hand, must have likewise disposed his nosegay with similar attention to his convenience. It may be here remarked, that our fruit-trees are easily scaled, and different, in this respect, from most forest-trees. Farther, all those which produce fruits that are soft, when in a state of perfect maturity, and which would have been liable to be bruised in falling, such as the fig-tree, the mulberry, the plumb, the peach, the apricot, present their crop at a small distance from the ground: those, on the contrary, which yield hard fruit, and such as have nothing to risk from falling far, carry it aloft, as walnut-trees, chestnuts, and cocoas.

There is no less marvellousness of adaptation in the forms and sizes of fruits. Many of them are moulded for the mouth of Man, such as cherries and plumbs; others for his hand, such as pears and apples; others much larger, such as melons, have the sub-divisions marked, and seem destined to be a social family repast: nay, there are some in India, as the jacq, and with ourselves the pumpkin,

pion, large enough to be divided among a neighbourhood. Nature appears to have observed the same proportions in the various sizes of the fruits destined to the nutriment of Man, as in the magnitude of the leaves which are designed to afford him a shade in hot countries; for of these some are contrived to be a shelter for a single person, others for a whole family, and others for all the inhabitants of the same hamlet.

I shall not dwell long on the other relations which plants have with the habitation of Man, from their greatness and their attitude, though many very curious observations might be suggested on that subject. There are few of them but what are capable of embellishing his field, his roof, or his wall. I shall only remark, that the vicinity of Man is beneficial to many plants. An anonymous missionary relates, that it is firmly believed by the Indians, that the cocoa-trees which have houses around their roots, become much more beautiful than those where there are none; as if that useful tree took delight in being near the habitation of Man.

Another missionary, a bare-footed Carmelite, called Father *Philippe*, positively asserts, that when the cocoa-tree is planted close by houses or huts, it is rendered more fruitful by the smoke, by the
ashes,

ashes, and other circumstances connected with a human dwelling, so as to produce double the quantity of fruit. He adds, that, for this reason, the places in India which consist of palm-plantations, are crowded with houses and little cabins; and that the proprietors of those plantations give, at first, a pecuniary premium, as an inducement to come and live there, together with part of the crop when it is reaped. He farther adds, that though their fruits, which are very large and hard, frequently fall down from the trees, when they have attained a state of full maturity, either by the gnawing of the rats, or by the violence of the winds, there is not a single instance known of any person's being hurt by the fall. This appears to me no less extraordinary than it did to him*.

I might extend the influences of Man to several of our fruit-trees, especially the apple-tree and the vine. I never saw finer apple-trees in the *Païs de Gaux*, than those which grow around the habitations of the peasantry. It is true that the attention of the proprietor may have greatly contributed to this. I have sometimes felt myself stopped in the streets of Paris, to contemplate with delight small vines, the roots of which are in the sand,

* See *Voyage to the East*, of R. P. *Philippe*, a white friar Book vii. chap. 5. section 4.

and

and under the pavement, enriching with their clusters the complete front of a guard-house. One of them, I think about six or seven years ago, produced two crops in one year, as was announced in the public prints.

Animal Harmonies of Plants with Man.

But Nature was not satisfied with having given to Man a bower, and a carpet, loaded with fruit ; this would not have availed him, had she not likewise furnished him, in the vegetable order itself, the means of defence against the depredations of wild beasts. In vain would he have watched over the preservation of his property through the day, had it been exposed to pillage during the night. She has bestowed a prickly shrubbery to enclose him round and round. The farther we advance southward, we find the greater variety in the species of these. But, on the contrary, we see few, if any, of those thorny shrubs in the North, where they appear useless ; there being no orchards to defend. They seem to be produced, in both Indies, for every kind of situation. Though I have been only on the selva, as I may say, of those countries, I have seen there a great number of such shrubs, the study of which presented a great variety of curious remarks to a Naturalist.

Among

Among others, I took particular notice of one, in a garden on the Isle of France, which to me appeared proper for composing a fence impenetrable to the smallest of quadrupeds. It rises in form of a stake, about the thickness of a man's arm, quite straight, without branches, and bearing no verdure except a small bunch of leaves on it's summit. It's bark is bristled all over with very strong, and very sharp prickles. It attains the height of seven or eight feet, and grows as thick above as below. A series of these shrubs, planted close to each other, would form a real pallisado, without the smallest interval. The opuntia and the taper, so common under the Torrid Zone, are armed with prickles so keen, that they pierce the soles of your shoes if you venture to walk over them. There is not a tyger, or lion, or elephant, that dares to approach them. There is another species of thorn, in the Island of Ceylon, which is employed as a defence against Man himself, accustomed as he is to force his way through every obstacle. *Robert Knox*, whom I have before quoted, informs us, that the avenues of the kingdom of Candy, in the Island of Ceylon, are blockaded only with faggots of those thorns, with which the inhabitants obstruct the passes of their mountains.

Man finds in vegetables, protection, not only against ferocious animals, but against reptiles and insects.

insects. Father *du Tertre* tells us, that he one day found, in the Island of Guadaloupe, at the foot of a tree, a creeping plant, the stem of which presented the figure of a serpent. But he was much more surprized on perceiving seven or eight snakes lying dead around it. He communicated this discovery to a medical man, who, by means of it, performed many wonderful cures, by employing it in the cases of persons bitten by those dangerous reptiles. It is generally diffused over the rest of the Antilles Islands, in which it is known by the name of snake-wood. It is likewise found in the East-Indies. *John Hugo de Linschotten* ascribes to it the same figure, and the same qualities.

We have, in our own climates, vegetables which present very strange correspondencies and contrasts with reptiles. *Pliny* tells us, that serpents are very fond of the juniper and the fennel, but that they are rarely found under the fern, the trefoil, the ash-weed, and the rue; and that betony kills them. Other plants, as has already been mentioned, destroy flies, such as certain species of the *dionæa*. *Thevenot* assures us, that in the Indies, grooms defend their horses from the flies, by rubbing them every morning with the flowers of the pumpion. The fleabane, which bears black and shining grains, resembling a flea, clears the house of that vermin, if *Dioscorides* is to be credited.

The

The echium, which has it's seed formed like the head of a viper, is fatal to those reptiles. It is probable, that, from such configurations, men, in the earlier ages of the World, discovered the relations and the oppositions between plants and animals. I am disposed to believe, that each genus of insect has it's destructive vegetable with which we are unacquainted. In general, all vermin shuns perfume.

Nature has farther given us, in plants, the first patterns of nets for hunting and fishing. There grows on certain heaths in China, a species of rattan, so interwoven and so strong, as to catch and hold fast the stag, though in full vigour. I myself have seen on the sands of the sea-shore in the Isle of France, a species of lianne, called the false-potatoe, which covers whole acres, like a vast fishing net. It is so perfectly adapted to this very purpose, that the Negroes actually employ it in fishing. They form, with the stems and foliage of it, a very long series of cordages, which they cast into the sea; and having disposed them in a chain encompassing a great space on the water, they draw it ashore by the two extremities. They scarcely ever fail to bring out fish *, for the fishes are terrified, not only by a net which encloses them, but

* See *Francis Pyrard's Voyage to the Maldivias.*

by every unknown substance which forms a shade on the surface of the water. By employing an industry equally simple, and nearly similar, the inhabitants of the Maldivia Islands carry on fisheries to a prodigious extent, employing no other means to decoy the fish into their receptacles, except a cord floating on the water, with the help of sticks.

Human, or elementary Harmonies of Plants.

There is not a single plant on the face of the Earth, but what has certain relations to the necessities of Man, and which does not serve, somewhere or another, for clothing to him, for a shelter, for pleasure, for medicine, or, at least, for fuel. Some, which with us are entirely useless, are in high estimation in other parts of the World. The Egyptians put up frequent and fervent prayers for a plentiful crop of nettles, from the seeds of which they extract an oil, while the stem furnishes them with a thread, which they weave into excellent cloth. But those general relations, being innumerable, I shall confine myself to a few particular observations, respecting the plants which minister to the first of human wants, I mean the food of Man.

We

We remark, first, that corn, which serves for the general subsistence of the Human Race, is not produced by vegetables of a lofty stature, but by simple grasses. The principal support of human life is borne on herbage, and is exposed to the mercy of every breath of wind. There is reason to believe, that had we ourselves been intrusted with the safety of our crops, we would not have failed to place them on great trees; but in this, as well as in every thing else, we are bound to admire Divine Providence, and to mistrust our own wisdom. Had our harvests been the produce of the forests, in the event of these being destroyed by war, or set on fire through our own imprudence, or rooted up by the winds, or ravaged by inundations, whole ages would have been requisite to re-produce them in a country. Farther, the fruits of trees are much more liable to drop off, than the seeds of grasses. The grasses, as has been already observed, carry their flowers in an ear, in many cases surmounted by little beards, which do not defend their seeds from the birds, as *Cicero* says, but which serve, as so many little roofs, to shelter them from the water which falls from Heaven. The drops of the rain cannot drown them, as they do flowers radiated, in disks, in roses, and in umbels, the forms of which, however are adapted to certain places and to certain seasons; but those of the grasses are adapted to every exposure.

When

When they are borne in flowing and drooping plumes, such as those of most grasses of hot countries, they are sheltered from the heat of the Sun; and when collected into an ear, as those of most grasses of cold countries, they reflect his rays on at least one side. Farther, by the suppleness of their stems, strengthened by joints from distance to distance, and by their filiform and capillaceous leaves, they escape the violence of the winds. Their weakness avails them more than strength does the great trees. Like small fortunes, they are re-sown and multiplied, by the very same tempests which lay waste the vast forests.

They farther resist the effect of excessive dryness by the length of their roots, which go, in quest of moisture, a great way under ground; and though their leaves are narrow, they have them in such numbers, that they cover the face of the ground with plants endlessly multiplied. At the slightest shower, you see them all rear themselves into the air, at their extremities, as if they were so many claws. They even resist conflagration, which consumes so many trees in the forest. I have seen countries in which they every year set the herbage on fire, in the season of drought, re-cover themselves, as soon as it rained, with the most lovely verdure. Though this fire be so active, as frequently to devour, root and branch, the trees which come into
contact

contact with it, the roots of herbage sustain no great injury from it.

They have, moreover, the faculty of re-producing themselves in three different ways, by shoots which push away from their roots, by creeping branches, which they extend to a distance, and by grains extremely volatile or indigestible, which the winds and the animals scatter about on every side. The greatest part of trees, on the contrary, naturally regenerate themselves only by their seeds. Add to the general advantages of grasses, an astonishing variety of characters, in their florification and in their attitudes, which renders them more proper than vegetables of every other class, to grow in every variety of situation.

It is in this cosmopolite family, if I may be allowed the expression, that Nature has placed the principal aliment of Man ; for the various species of corns, on which so many human tribes subsist, are only so many species of grasses. There is no land on the Globe where some kind of corn or another may not be raised. *Homer*, who had studied Nature so accurately, frequently characterizes each country by the vegetable peculiar to it. One island he celebrates for it's grapes, another for it's olive-trees, a third for it's laurels, and a fourth for it's palms ; but to the Earth only he gives the general

epithet of *Zeídωpa*, or corn-giving. Nature, in fact, has formed it for growing in all situations, from the Line to the very border of the Frozen Ocean. One species is adapted to the humid places of warm countries, as the rice of Asia, which grows in vast abundance in the muddy swamps by the side of the Ganges. Another is suited to the marshy grounds of cold countries; such is a kind of false-oats, which naturally grows on the banks of the rivers of North-America, and of which many savage Nations annually raise immense crops*.

Other kinds of corn thrive wonderfully well on warm and dry lands, as the millet and the pannick of Africa, and the maize of Brasil. In our climates, wheat agrees best with a strong soil, rye with a sandy one, buck-wheat with rainy declivities, oats with humid plains, barley with stony ground. Barley succeeds in the very bosom of the North. I have seen, as far up as the sixty-first degree of North-Latitude, amidst the rocks of Finland, crops of this grain as beautiful as ever the plains of Palestine produced.

Corn affords an abundant supply to all the necessities of Man. With it's straw he enjoys the

* Consult Father *Hennepin*, a Franciscan: *Champlain*, and other Travellers through North-America.

means of lodging, of covering, of warming himself, and of feeding his sheep, his cow, and his horse; with it's grain he can compound aliments and liquors of every flavour. The northern Nations brew it into beer, and distil from it strong waters, more potent than those from wine; such are the distillations of Dantzick. The Chinese * extract from rice, a wine as agreeable as the best wines of Spain. The Brasilians prepare their *ouicon* with maize. In a word, with oats torrefied, it is possible to compose a cream which shall have the perfume of the vanilla. If we unite with these qualities those of the other domestic plants, most of which likewise grow all over the Earth, we shall find in them the favour of the clove, of pepper, of other spiceries; and without going farther than our own gardens, we shall be able to collect the delicacies scattered over the rest of the vegetable Creation.

We may distinguish, in the barley and the oats, the elementary characters which have been formerly indicated, and which vary the species of plants of the same genus, in a conformity to the situations where they are designed to grow. The barley destined to dry places has leaves broad and open at their base, which convey the rain-water to the root

* Journey to China, by *Iffrand-Ides*.

of the plant. The long beards which surmount the coat that is wrapped round the grain, are bristled with denticulations, very much adapted to the purpose of making them adhere to the hair of animals, and of re-fowing them in lofty and dry situations. The oats, on the contrary, destined to humid places, have narrow leaves, gathered close around the stem, in order to intercept the rain-water. The coats of this plant distended, similar to two long half-bladders, and not very closely adhering to the grain, render it proper for floating, and crossing the water by the help of the winds. But here we are presented with a still more wonderful fact, which will confirm what has been advanced, respecting the uses of the different parts of plants, relatively to the elements, and which extends the views of Nature even beyond the fructification, though we have considered this as the determining character; it is, that barley, in rainy years, degenerates into oats, and that oats, in dry seasons, change into barley.

This observation, related by *Pliny*, *Galen*, and *Mathiola*, the Commentator of *Dioscorides* *, has been confirmed by the experiments of several modern Naturalists. *Mathiola*, indeed, alleges, that this transformation of barley is not into oats pro-

* See *Mathiola* on *Dioscorides*, book iv. page 432.

perly so called, which he denominates *Bromos*, but into a plant which, at first sight, resembles it, and to which he gives the name of *Ægilops*. This transformation, demonstrated by the frequently repeated experiments of the husbandmen of his country, and by that which the father of *Galen* made, expressly for his own satisfaction; together with that of the flowers of the linarium, and of the leaves of many vegetables, are sufficient proof, that the elementary relations of plants, are only secondary relations, and that animal, or human, relations are the primary. Thus, Nature has placed the character of a plant, not only in the form of the fruit, but in the substance of that very fruit.

Hence I presume, that having formed, in general, of a mealy substance, the basis of human life, Nature has diffused it over all situations, on different species of grasses; that afterwards, intending to add to this, certain modifications relative to some humors of the human temperament, or to some influence of season, or of climate, she has formed other combinations of it, which she has deposited in leguminous plants, such as pease and beans, which the Romans comprehended in the class of corn-plants; that, finally, she has formed another sort of it, which she has laid up in the fruits of trees, such as chestnuts, or in roots,

as potatoes, and other farinaceous under-ground vegetables.

Those adaptations of substance to every climate are so infallibly certain, that, in every country, the fruit which is most common there is the best, and the most wholesome. Hence I farther presume, that she has followed the same plan with respect to medicinal plants; and that having diffused over various families of vegetables, virtues relative to our blood, to our nerves, to our humors, she has modified them in every Country, conformably to the diseases which the climate of each particular country generates, and has placed them in opposition with the particular characters of those same diseases. It is, in my opinion, from the neglect of these observations, that so many doubts and disputes have been excited respecting the virtues of plants. A simple, which, in one country, is an infallible cure for a malady, may, sometimes increase it in another. The Jesuits-powder, which is the pounded bark of a species of fresh-water manglier of Mexico, is a remedy for the fevers of America, of a kind peculiar to damp and hot situations, but frequently fails when applied to those of Europe. Every medicine is modified according to the place, just as every malady is.

I shall

I shall pursue this reflection no farther, as it would lead me into a deviation from my subject; but if Physicians would pay the attention to it which it merits, they must study more carefully the plants of their own country, and not prefer to them, as they generally do, those of foreign climates, which they are under the necessity of modifying a thousand different ways, in order to give them, as chance may direct, an adaptation to local maladies. One thing is certain, namely, that when Nature has determined a certain favour in any vegetable, she repeats it all over the Earth, with a variety of modifications, which do not, however, prevent our distinguishing it's principal virtue. Thus, having placed the *cochlearia* (scurvy-grass) that powerful anti-scorbutic, even on the foggy shores of Spitzbergen, she has repeated the favour and the medicinal qualities of it, in the cresses of our brooks, in the garden cresses, in the nasturtium, which is a cress of the rivers of Peru; in a word, in the very grains of the papaya, which grows in humid places of the Antilles Islands. We find, in like manner, the favour, the smell, and the medicinal qualities of our garlic, in the woods, the barks, and the mosses of America*.

* I must here observe that garlic, the smell of which is so formidable to our fine ladies, is, perhaps, the most infallible remedy in the World against the vapours, and all the nervous disorders to which women are so subject. Of this I have had re-

These considerations induce me to believe, that the elementary characters of plants, and their entire configuration are only secondary means, and that their

peated experience. Nay, *Pliny* goes so far as to assure us, that it is a cure for the epilepsy. It is, besides, an antiseptic; and every plant which has it's smell, has also the same virtues. It is very remarkable, that plants which smell like garlic, usually grow in marshy places, as a remedy, provided by Nature, against the putrid emanations thence exhaled. Such is, among others, the *scordium*. *Galen* relates, that it's antiseptic virtue became demonstrable from this, that after a battle, the dead bodies which happened to be in contact with plants of the *scordium*, were found to be in a much less putrid state than those which were not; and that those bodies remained fresh and sound chiefly in the parts which actually touched the plant. But the experiment which the Baron *Busbequius* made with it, upon living bodies, is still more striking. That great Man, on his return from the first journey which he made to Constantinople, was attended by a numerous retinue. A Turk of his suite was attacked with the plague, and died. His companions resolutely divided his spoils among themselves, in defiance of the remonstrances of the Physician of *Busbequius*, who assured them that the pestilence would thereby be immediately communicated. In fact, a few days after, the symptoms of that dreadful malady became apparent among them.

But let us permit the intelligent and virtuous Ambassador himself to give an account of the consequences of this alarming event. "The day after our departure from Adrianople," says he, "they all came to him (the Physician) with a sad and dejected air, complaining of a violent head-ach, and imploring relief. They were perfectly sensible that they were affected with the first symptoms of the pestilence. My Physician reprimanded them

"severely,

their principal character is referable to the necessities of Man. Thus, in order to establish in plants an order simple and agreeable, instead of running
over

“severely, saying he was astonished how they dared to apply to
“him for a remedy from an evil of which he had fore-warned
“them, and which they had obstinately persisted in bringing upon
“themselves. Not, however, that he intended to with-hold any
“assistance which might be in his power. On the contrary, he
“became extremely uneasy about the means of relieving them:
“But where was the possibility of finding medicine on a road
“frequently subjected to a failure of the most common necessities of life? Providence became our only refuge, and we
“were effectually succoured in this trying hour. I am going to
“relate in what manner.

“It was my custom, on our arrival at the different halting-
“places on the road, to go a-walking in the vicinity, and to take
“a view of every thing curious. That day I was so fortunate as
“to bend my course to an adjacent meadow. My eye happened
“to catch sight of a plant with which I was unacquainted;
“I picked up some of it's leaves, and put them to my nose:
“they smelled of garlic. I handed them to my Physician, asking
“him if he knew the plant. After having attentively examined
“it, he replied that it was the scordium. He lifted up his hands
“to Heaven, and gave thanks to God for the seasonable relief
“which He had sent us. He instantly gathered a considerable
“quantity, put it into a large kettle, and boiled it thoroughly.
“Then, calling for the patients, desired them to take courage,
“and, without the loss of a moment, made them drink copiously
“of the decoction of that plant, with a slight infusion of the
“earth of Lemnos: he then had them well warmed, and put to
“bed, desiring them not to go to sleep till they had fallen into a
“profuse perspiration, with which they exactly complied. The
“next

over successively their elementary, vegetable, animal, and human harmonies, it would be more proper to invert this order, but without changing it, and to set out with the plants which present to Man a supply for his first wants, to proceed thence to the uses which animals derive from them, and to conclude with the situations which determine their varieties.

This order may be followed so much the more easily, that the first point of departure is fixed by the smell and the taste. The testimony of these two senses is far from being contemptible; for they assist us in ascertaining the intimate qualities of plants, much better than the decompositions of Chemistry; it may be extended to the whole vegetable kingdom, inasmuch as there is not a single genus of plants, varied into umbelliferous, rose-formed, papilionaceous, and the rest, but what presents food to Man, in some part or another of the Globe. The ciperus of Ethiopia bears, at it's root, bulbs which have the taste of almonds. That which in Italy is called *Trafi* produces bulbs which

" next day they felt themselves greatly relieved. A similar dose
 " was repeated, and the whole ended in a perfect cure. Thus,
 " through the goodness of God, we escaped a death which stared
 " us immediately in the face." (Letters of the Baron *Busbequius*
 " vol. i. page 197 and 198.)

taste

taste like chestnuts *. We have found, in America, the potatoe in the class of *solana*, which are poisons. It is a jasmine of Arabia, which supplies us with the coffee-berry. The eglantine, with us, produces berries fit only for the use of birds; but that of the Land of Yesso, which grows there among rocks, and the shells on the sea-shore, bears cups so large and so nourishing, that they serve for food to the inhabitants of those shores, for a considerable part of the year †. The ferns of our hills are unproductive; but there grows in North-America a species of this plant, called *Filix baccifera*, loaded with berries, which are very good to eat ‡. The tree itself of the Molucca Islands, called *Libbi* by the inhabitants, and palm-sago by travellers, is, in the judgment of our Botanists, merely a fern. This fern contains in it's trunk the sago, a substance lighter, and more delicate than rice. In a word, there are even certain species of seaweed, which the Chinese eat with delight, among others, those which compose the nests of a species of swallow.

By disposing in this order, therefore, the plants which produce the principal subsistence of Man,

* See the Catalogue of Garden-Plants of Boulogne, by *Hyacinth Ambrosino*

† Consult Collection of Voyages by *Thevenot*.

‡ See *Father Charlevoix*, his History of New France.

as the grasses, we should have, first, for our own country ; the wheat of strong lands, the rye of the sands, the barley of the rocks, the oats of humid places, the buck-wheat of rainy declivities ; and for other climates and exposures, the pannic, the millet, the maize, the Canadian oats, the rice of Asia, some species of which thrive in dry situations ; and so of the rest.

It would be farther useful to ascertain on the Globe the places to which the several origin of each alimentary plant might be referred. What I have to advance on this subject may be conjecture merely, but it appears to me to have an air of probability. I am of opinion, then, that Nature has placed in islands the species of plants which are most beautiful, and best adapted to the necessities of Man. First, islands are more favourable to the elementary expansions of plants, than the interior of continents, for there is no one but what enjoys the influences of all the elements, being completely surrounded by the winds and the seas, and frequently in it's interior, possessing the combined advantages of plains, of sands, of lakes, of rocks, and of mountains. An island is a little world in epitome. Secondly, their particular temperature is so varied, that you find of them in all the principal points of Longitude and Latitude, though there be a considerable number still unknown to

us,

us, particularly in the South-Seas. Finally, experience demonstrates, that there is not a single fruit-tree in Europe, but what becomes more beautiful in some of the islands along it's coasts, than in the Continent.

I have spoken of the beauty of the chestnut-trees of Corsica and Sicily : but *Pliny*, who has preserved to us the origin of the fruit-trees which were in Italy in his time, informs us, that most of them had been imported from the islands of the Archipelago. The walnut came from Sardinia ; the vine, the fig-tree, the olive, and many other fruit-trees, were natives of the other islands of the Mediterranean. Nay, he observes, that the olive-tree, as well as several other plants, thrives only in the vicinity of the Sea. All modern travellers confirm these observations. *Tavernier*, who had so many times traversed the Asiatic Continent, assures us, that no olive-trees are to be seen beyond Aleppo. An anonymous English traveller, whom I have already quoted with approbation, positively asserts, that no where, on the Continent, are there to be found fig-trees, vines, mulberries, as well as many other fruit-trees, once to be compared, either as to magnitude or fertility, with those of the Archipelago, notwithstanding the carelessness and indolence of the wretched possessors. To these I
might

might add a great many other vegetables, which thrive only in those islands, and which furnish to the commerce of Europe, gums, mannas, and dye-stuffs. The apple-tree, so common in France, produces no where such fine fruit, and of species so varied, as on the shores of Normandy, under the breath of the sea-breeze from the West. I have no doubt that the fruit which was proposed as the prize of beauty had, like *Venus* herself, some favourite isle.

If we carry our remarks even into the Torrid Zone, we shall find that it is neither from Asia, nor from Africa, that we obtain the clove, the nutmeg, the cinnamon, the pepper of the best quality; the benzoin, the sandal-wood, the sagoe, and many others, but from the Molucca Islands, or from those which are in the same seas. The cocoa-tree attains it's perfect beauty only in the Maldivia Islands. Nay, there are, in the archipelagos of those Seas, a great number of fruit-trees described by *Dampier*, which have not yet been transplanted into the Old Continent; such as the grape-tree. The double cocoa is to be found only in the Sechelles Islands. The islands recently discovered in the South-Sea, such as that of Taïti, have presented us with trees hitherto unknown, as the bread-fruit, and the mulberry tree, the bark
of

of which serves to make cloth. As much may be said of the vegetable productions of the Islands of America relatively to their Continent.

These observations might be extended even to the very birds and quadrupeds, which are more beautiful, and of species more varied, in islands, than any where else. The elephants held in highest estimation in Asia, are those of the Island of Ceylon. The Indians believe them to be possessed of something divine; nay, more, they allege, that other elephants acknowledge this superiority. One thing is certain, they fetch a higher price all over Asia than any others. In a word, travellers the most worthy of credit, and who have made the most accurate observations, as the English *Dampier*, Father *du Tertre*, and some others, assure us, that there is not a shallow in the seas lying between the Tropics, but what is distinguished by some sort of bird, of crab, of turtle, or of fish, which is nowhere else to be found, either of species so varied, or in so great abundance. I presume that Nature has thus scattered her choicest benefits over the islands, in order to allure men thither, and to pervade the Earth. These are only conjectures, I grant; but they rarely deceive us when they are founded on the wisdom and goodness of the AUTHOR of Nature.

The

The finest species of corn, therefore, which is wheat, might be referred to Sicily, where, in fact, they pretend it was originally found. Fable has immortalized this discovery, by making that island the scene of the amours of *Ceres*; as well as the birth of *Bacchus*, in the Isle of Naxos, because of the beauty of it's vines. This much is certain, that corn is no where indigenous but in Sicily, if, however, it still re-perpetuates itself there spontaneously, as the Ancients affirm.

After having determined in the same manner, the other human accommodations of the grasses to different situations of ground, we might examine the grasses which exhibit marked relations to our domestic animals, such as the ox, the horse, the sheep, the dog. We might characterize them by the names of these animals. We should have the *gramen bovinum, equinum, ovinum, caninum*. The different species of each of these genera, might afterwards be distinguished by the names of the different places where they are found by the several animals; on the banks of rivers, among rocks, on sands, on mountains; so that by the addition of the epithets, *fluviatile, saxatile, arenosum, montanum*, you might supply, in two words, all the verbose phraseology of our botanical compositions.

We

We might apportion, in like manner, the other grasses, to the different quadrupeds of our forests, as to the stag, to the hare, to the wild boar, and so on. These first determinations would require certain experiments to be made on the tastes of animals, but they would be very instructive, and highly amusing. They would have no mixture of cruelty, as most of those of our modern physics have, by which the wretched animal is flead alive, poisoned, or suffocated, in order to come at the knowledge of it's propensities. Our experiments would study their appetites only, and not their convulsions. Besides, there are a great many of those preferred and rejected plants, already well-known to our shepherds. One of them shewed me, in the vicinity of Paris, a gramineous plant, which fattens sheep more in a fortnight, than the other species can do in two months. The moment, too, that they perceive it, they run after it with the utmost avidity. Of this I have been an eye-witness. I do not mean, however, to assert that each species of animal limits it's appetite to a single species of food. It is quite sufficient, in order to establish the order which I am proposing, that each of them gives, in every genus of plant, a decided preference to some one species; and this is confirmed, beyond all doubt, by experience.

The great class of the gramineous plants being thus apportioned to Man and animals, other plants would present still greater facility in their appropriations, because they are much less numerous. Of the fifteen hundred and fifty species of plants, enumerated by *Sebastian le Vaillant* in the country adjacent to Paris, there are more than a hundred families, among which that of the grasses comprehends, for its share, eighty-five species, exclusive of twenty-six varieties, and our different sorts of corns. It is the most numerous next to that of mushrooms, which contains a hundred and ten species, and that of mosses, which contains eighty-six. Thus, instead of the systematic classification of botanic Writers, which gives no explanation of the uses of most of the vegetable parts, which frequently confounds plants the most heterogeneous, and separates those of the same genus, we should have an order simple, easy, agreeable, and of an infinite extent, which passing from Man to animals, to vegetables, and to the elements, would discover to us the plants which serve to our use, and to that of other sensible Beings, would render to each of them its elementary relations, to each site on the Earth its vegetable beauty, and would replenish the heart of Man with admiration and gratitude. This plan appears so much the more conformable to that of Nature, that it is entirely comprehended

prehended in the benediction which it's AUTHOR pronounced upon our first parents, saying unto them * : " Behold, I have given unto you every
" herb bearing seed, which is upon the face of all
" the Earth, and every tree, in the which is the
" fruit of a tree yielding seed, *after it's kind*: to
" you it shall be for meat: and to every beast of
" the Earth, and to every fowl of the air, and to
" every thing that creepeth upon the Earth,
" wherein there is life, I have given every green
" herb for meat."

This benediction is not confined, as far as Man is concerned, to some primordial species in each genus. It is extended to the whole vegetable kingdom, which converts itself into aliment fit for his use, by means of the domestic animals. *Linnaeus* has presented to them, from the eight to the nine hundred plants which Sweden produces, and he remarked that, of these, the cow eats two hundred and eighty-six; the goat, four hundred and fifty-eight; the sheep, four hundred and seventeen; the horse, two hundred and seventy-eight; the hog, one hundred and seven. The first animal refuses only one hundred and eighty-four of them; the second, ninety-two; the third, one hundred and twelve; the fourth, two hundred and seven;

* Genesis, chap. i. ver. 29, 30.

the fifth, one hundred and ninety. In these enumerations he comprehends only the plants which those animals eat with avidity, and those which they obstinately reject. The others are indifferent to them. They eat them when necessity requires, and even with pleasure, when they are tender. Not one of them goes to waste. Those which are rejected by some, are a high delice to others. The most acrid, and even the most venomous, serve to fatten one or another. The goat browses on the ranunculus of the meadow, though hot as pepper, on the tithymal and the hemlock. The hog devours the horse tail and henbane. He did not put the ass to this kind of proof, for that animal does not live in Sweden, nor the rein-deer, which supplies the want of him to so much advantage in northern regions, nor the other domestic animals, such as the duck, the goose, the hen, the pigeon, the cat, and the dog.

All these animals united, seem destined to convert to our advantage every thing that vegetates, by means of their universal appetites, and especially by that inexplicable instinct of domesticity which attaches them to Man; whereas no art can communicate it either to that timid animal the deer, nor even to some of the smaller birds, which seek to live under our protection, such as the swallow, who builds her nest in our houses. Nature has
bestowed

bestowed this instinct of sociability with Man, only on those whose services might be useful to him at all seasons ; and she has given them a configuration wonderfully adapted to the different aspects of the vegetable kingdom.

I say nothing of the camel of the Arabian, which can travel under a load, for several days together, without drinking, in traversing the burning sands of Zara ; nor of the rein-deer of the Laplander, whose deeply-cleft hoof can fasten, and run along, on the surface of the snow ; nor of the rhinoceros of the Siamese and of the Peguan, who, with the folds of his skin, which he can distend at pleasure, is able to disengage himself out of the marshy grounds of Siriam ; nor of the Asiatic elephant, whose foot, divided into five ergots, is so sure on the steep mountains of the Torrid Zone ; nor of the lama of Peru, who, with his forked feet, scrambles over the rocky heights of the Cordeliers. Every extraordinary situation is maintaining for Man a useful and commodious servant,

But without removing from our own hamlets, the single-hoofed horse pastures in the plains, the ponderous cow in the bottom of the valley, the bounding sheep on the declivity of the hill, the scrambling goat on the sides of the rocks ; the hog, furnished with a proboscis, rakes up the morafs

from the bottom ; the goose and the duck feed on the fluviatic plants ; the hen picks up every grain that was scattered about, and in danger of being lost in the field ; the four-winged bee collects a tribute from the small dust of the flowers ; and the rapid pigeon hastens to save from loss the grains which the winds had conveyed to inaccessible rocks. All these animals, after having occupied through the day the various sites of vegetation, return in the evening to the habitation of Man, with bleatings, with murmurings, with cries of joy, bringing back to him the delicious produce of the vegetable creation, transformed, by a process altogether inconceivable, into honey, into milk, into butter, into eggs, and into cream.

I take delight in representing to myself those early ages of the World, when men travelled over the face of the Earth, attended by their flocks and herds, laying the whole vegetable kingdom under contribution. The Sun, going before them, in the Spring, invited them to advance to the farthest extremities of the North, and to return with Autumn bringing up his train. His annual course in the Heavens seems to be regulated by the progress of Man over the Earth. While the Orb of Day is advancing from the Tropic of Capricorn to that of Cancer, a traveller departing on foot from the Torrid Zone, may arrive on the shores of the
Frozen

Frozen Ocean, and return thence into the Temperate Zone, when the Sun traces backward his progress, at the rate of only four, or, at most, five leagues a day, without being incommoded, the whole journey through, with either the sultry heat of Summer, or the frost of Winter. It is by regulating themselves according to the annual course of the Sun, that certain Tartar-hordes still travel.

What a spectacle must the virgin Earth have presented to it's first inhabitants, while every thing was as yet in it's place, and Nature not yet degraded by the injudicious labours, or the desperate madness of Man! I suppose them taking their departure from the banks of the Indus, that land which is the cradle of the Human Race, on a progress northward. They first crossed the lofty mountains of Bember, continually covered with snow, which, like a rampart, encompasses the happy land of Cachemire, and separate it from the burning kingdom of Lahor*. They presented themselves to their eyes like vast amphitheatres of verdure, clothed, to the South, with all the vegetables of India, and, to the North, with all those of Europe. They descended into the vast basin which contains them, and there they beheld a part of the fruit-trees which were destined one day to enrich

* Consult *Bernier's Description of the Mogul Country.*

our orchards. The apricots of Media, and the peach-trees of Persia, skirted, with their blooming boughs, the lakes, and the brooks of living water which bedew their roots. On leaving the ever-green vallies of Cachemire, they quickly penetrated into the forests of Europe, and went to repose under the foliage of the stately beech and tufted elm, which had as yet shaded only the loves of the feathered race, and which no Poet had hitherto sung. They crossed the boundless meadows which are washed by the Irtis, resembling Oceans of verdure, here and there diversified with long beds of yellow lilies, with stripes of ginzang, and tufts of broad-leaved rhubarb. Following the track of it's current, they plunged into the forests of the North, under the majestic branches of the fir, and the moving foliage of the birch,

What smiling vallies opened to their view, along the rivers-side, and invited them to deviate from the road, by promising them objects still more lovely ! What hills enamelled with unknown flowers, and crowned with ancient and venerable trees, endeavoured to persuade them to proceed no farther ! Arrived on the shores of the Icy Sea, a new order of things arose to view. There was now no more night. The Sun encompassed the Horizon round and round ; and the mists, dispersed through the air, repeated, on different planes, the lustre of his rays

rays in rainbows of purple, and parhelions of dazzling radiance. But, if the magnificence of the Heavens was multiplied, desolation covered the face of the Earth. The Ocean was hoary with mountains of floating ice, which appeared in the Horizon like towers and cities in ruin; and on the land, nothing to be seen, in place of groves, but a wretched shrubbery blasted by the winds, and instead of verdant meads, rocks clothed with moss. The flocks which had accompanied them must there undoubtedly have perished; but even there Nature had still made provision for the necessities of Man. Those shores were composed of massy beds of coal*. The seas swarmed with fishes, and the lakes with fowls. They must find, among the animal tribes, servants and assistants: the rein-deer appeared in the middle of the mosses: she presented to those wandering families, the services of the horse in her agility, the fleece of the sheep in her fur; and shewing them, like the cow, her four teats, and but one nursing, she seemed to tell them that she was destined, like her, to share her milk with mothers oppressed by a too numerous offspring,

But the East must have been the part of the Globe which first attracted the attention of Man-

* Professor *Gmelin's* Journey to Siberia.

kind. That place of the Horizon where the Sun arises, undoubtedly fixed their wondering eyes, at a period when no system had interposed to regulate opinion. On seeing that great Luminary arising, from day to day, in the same quarter of the Heavens, they must have been persuaded that he there had a fixed habitation, and that he had another where he set, as a place of rest. Such imaginations, confirmed by the testimony of their eyes, were, it must be admitted, natural to men destitute of experience, who had attempted to erect a tower which should reach to Heaven, and who, even in the illumination of more scientific ages, believed, as a point of religion, that the Sun was drawn about in a chariot by horses, and retired every evening to repose in the arms of *Thetis*. I presume, they would be determined to go in quest of him rather toward the East than toward the West, under the persuasion that they would greatly abridge their labour, by advancing to meet him,

It must have been this conviction, I am disposed to think, which left the West, for a long time, in a deserted state, under the very same Latitudes which, in the East, were swarming with inhabitants, and which first sent men in crowds toward the eastern part of our Continent, where the earliest and most populous Empire of the World, that of China, was formed. What confirms me
farther

farther in the belief, that the first men, who advanced toward the East, were engaged in this research, and were in haste to reach their object, is this, that having taken their departure from India, the cradle of the Human Race, like the founders of other Nations, they did not, like them, people the Earth progressively, as Persia, Greece, Italy, and Gaul, were successively, in a westerly direction; but leaving desert the vast and fertile countries of Siam, of Cochinchina, and of Tonquin, which are to this day half barbarous and uninhabited, they never gave up the pursuit till they were stopped by the Eastern Ocean; and they gave to the islands which they perceived at a distance, and on which they did not for a long time, acquire the skill to land, the name of *Gepuen*, which we have transformed into Japan, and which, in the Chinese language, signifies, birth of the Sun.

Father *Kircher* * assures us, that when the first Jesuit Astronomers arrived in China, and there reformed the Calendar, the Chinese believed the Sun and the Moon to be no bigger than they appear to the eye; that, on setting, they retired to a deep cave, from which they issued next day at the time of rising; and, finally, that the Earth was a plane and smooth surface. *Tacitus*, who has written His-

* See China illustrated, chap. ix.

tory with such profound judgment, does not deem it to be beneath him, in that of Germany, to relate the traditions of the western Nations, who affirmed, that toward the North-west was the place where the Sun went to bed, and that they could hear the noise which he made on plunging into the waves.

It was from the quarter of the East, then, that the Orb of Day first attracted the curiosity of Mankind. There were, likewise, tribes which directed their course toward that point of the Globe, taking their departure from the southern part of India. These advanced along the peninsula of Malacca; and, familiarized with the Sea, which they coasted most of the way, they were induced to form the resolution of availing themselves of the united accommodation which the two elements present to travellers, by navigating from island to island. They thus pervaded that vast belt of islands, which Nature has thrown into the Torrid Zone, like a bridge intersected by canals, in order to facilitate the communication of the two Worlds. When retarded by tempests, or contrary winds, they drew their barks ashore, cast a few seeds into the ground, reaped the crop, and deferred their re-embarkation till fairer weather, and a season more favourable, encouraged them to venture forth.

Thus

Thus it was that the early mariners performed their voyages, and that the Phenicians, employed by *Necho*, King of Egypt, made the circuit of Africa in three years, departing by way of the Red-Sea, and returning by the Mediterranean, according to the account given of it by *Herodotus**.

The first Navigators, when they no longer saw islands in the Horizon, paid attention to the seeds which the Sea cast upon the shore of those where they were, and to the flight of the birds which were withdrawing from it. On the faith of these indications, they directed their course toward lands they had never yet seen. Thus were discovered the immense Archipelago of the Moluccas, the Islands of Guam, of Quiros, of the Society, and, undoubtedly, many others which are still unknown to us. There was not one but what invited them to land, by presenting some attractive accommodation. Some stretched out along the waves like Nereïds, poured from their urns, rills of fresh water into the Sea : it was thus that the Island of Juan Fernandez, with its rocks and cascades, presented itself to Admiral *Anson*, in the midst of the South-Sea. Others, on the contrary, in the same Ocean, having their centres sunk, and their extremities elevated, and crowned with cocoa-trees, of-

* *Herodotus*, book iv.

fer to their canoes basons at all seasons tranquil, swarming with fishes and sea-fowls : such is that known by the name of *Woesterland*, or the Land of Water, discovered by the Dutch Navigator *Schouten*. Others, in the morning, appeared to them, in the bosom of the azure main, all over irradiated with the light of the Sun, as that one of the same Archipelago which goes by the name of *Aurora*. Some announce themselves in the darkness of night, by the flames of a volcano, as a pharos blazing aloft amidst the waters, or by the odoriferous emanations of their perfumes.

There was not one of them of which the woods, the hills, and the downs, did not maintain some animal, naturally familiar and gentle, but which becomes savage only from the cruel experience which it acquires of Man. They saw fluttering around them, as they disembarked on their strands, the silken-winged birds of paradise, the blue pigeons, the cacatoës all over white, the lauris all over red. Every new island tendered them some new present ; crabs, fishes, shells, pearl-oysters, lobsters, turtles, ambergris ; but the most agreeable, beyond all doubt, were the vegetables. Sumatra displayed, on her shores, the pepper plant ; Banda, the nutmeg ; Amboyna, the clove ; Ceram, the palm-sage ; Florès, the benzoin and sandalwood ; New-Guinea, groves of cocoa-trees ; Taïti, the

the bread-fruit. Every island arose in the midst of the Sea, like a vase which supported a precious vegetable. When they discovered a tree laden with unknown fruit, they gathered some branches of it, and ran to meet their companions with shouts of joy, exhibiting to them this new benefit bestowed by Nature.

From those early voyages, and from those ancient customs it is, that there has been diffused, over all Nations, the practice of consulting the flight of birds before engaging in any enterprize, and that of going to meet strangers, with the branch of a tree in the hand, in token of peace, and of joy at sight of a present from Heaven. These customs still exist among the islanders of the South-Sea, and among the free tribes of America. But not fruit-trees alone fixed the attention of the first Men. If some heroic action, or some irreparable disaster, had excited admiration, or inspired regret, the tree adjoining was ennobled by it. They preferred it, with those fruits of virtue or of love, to such as produced food or perfume. Thus, in the islands of Greece and of Italy, the laurel became the symbol of triumph, and the cypress that of eternal sorrow. The oak supplied crowns of undecaying honour to the well-deserving citizen, and simple grasses decorated the brows of the men who had saved their Country. O Romans! people
worthy

worthy of the Empire of the World, in that you opened to every one of your subjects the career of virtuous exertion, and culled the most common plants of the field to serve as the badge of immortal glory, that a crown for the head of virtue might be found on every spot of the Globe.

From similar attractions it was, that, from island to island, the Nations of Asia made their way to the New World, where they landed on the shores of Peru. Thither they carried the name of children of that Sun whom they were pursuing. This brilliant chimera emboldened them to attempt the passage to America. It was not dissipated till they reached the shores of the Atlantic Ocean: but it diffused itself over the whole Continent, where most of the Chiefs of the Nations still assume the title of Children of the Sun *.

Mankind

* I do not mean to affirm, however, that America was peopled only from the islands of the South-Sea. I believe that a passage was opened into it, likewise, by the North of Asia and of Europe. Nature always presents to Mankind different means for the attainment of the same end. But the principal population of the New World came from the islands of the South-Sea. This I am able to prove by a multitude of monuments still existing, and to the most remarkable of which I shall confine myself. It is demonstrated, then, by the worship of the Sun, established in India, in the islands of the South-Sea, and in Peru, as well as by the title of Suns, or Children of the Sun, assumed by

many

Mankind, encompassed with so many blessings, continues to be wretched. There is not a single genus of animal but what lives in abundance and liberty,

many families of those countries; by the traditions of the Caribs scattered over the Antilles, and in Brasil, who give themselves out as originally from Peru; by the very establishment of that Monarchy of Peru, as well as that of Mexico, situated on the western coast of America, which looks toward the islands of the South-Sea, and by the populousness of their Nations, which were much more considerable, and more polished than those which inhabited the eastern coasts, which supposes the former to be of a much higher antiquity; by the prodigious diffusion of the Taïtian language, the different dialects of which are spread over most of the islands of the South-Sea, and of which words innumerable are to be found in the language of Peru, as has lately been proved by a gentleman of great learning, and even in that of the Malays in Asia, some of which I myself was able to distinguish, particularly the word *maté* which signifies to kill; by the practices common and peculiar to the Nations of the Peninsula of Malacca, of the islands of Asia, of those of the South-Sea and of Brasil, which are not the inspiration of Nature, such as that of making fermented and intoxicating liquors, and of chewing herbs and roots; by the channels of the commerce of antiquity which flowed in this direction, such as that of gold, which was very common in Arabia and in the Indies, in the time of the Romans, though there be very few mines of that metal in Asia; but above all, by the trade of emeralds, which must have run in that track from remote antiquity, in order to reach the Old Continent, where no mine of that gem is to be found. Hear what is said on this subject by *Tavernier*, who is worthy of credit when he speaks of the commerce of Asia, especially as it relates to jewels. "It is an error of long standing," says he, "which

liberty, the greatest part without labour, all at peace with their species, all united to the objects of their choice, and enjoying the felicity of perpetuating

“ many persons have fallen into, to believe that the emerald was
 “ found originally in the East. Most jewellers, on first looking
 “ at a high-coloured emerald, are accustomed to say, this is an
 “ Oriental emerald. But they are mistaken, for I am well as-
 “ sured, that the East never produced one, either on the Conti-
 “ nent, or in it's islands. I have made accurate enquiries into
 “ this, in all the voyages I made.” He had travelled six times by
 land through India. Hence it must be concluded, that the so
 highly valued emeralds of the ancients, came to them from Ame-
 rica, through the islands of the South-Sea, through those of Asia,
 through India, the Red Sea, and, finally, through Egypt, from
 whence they had them.

To this may be objected the difficulty of navigating against the
 regular easterly winds, in order to pass from Asia to America,
 under the Torrid Zone; but, relatively to this subject, I shall
 repeat, that the regular winds do not blow there from the East,
 but from the North-east and South-east, and depend so much the
 more on the two Poles, the nearer you approach toward the
 Line. This oblique direction of the wind was sufficient for per-
 sons who navigated from island to island, and who had contrived
 barks the least liable to deflection, such as the double pros of the
 Isles of Guam, the form of which seems to have been preserved
 in the double balfes of the coast of Peru. *Schouten* found one of
 those double pros sailing more than six hundred leagues from
 the Island of Guam toward America. Besides, it appears, like-
 wise, that the South-Sea has it's monsoons, which have not hi-
 therto been observed. Hear the remarks made, on the variation
 of those winds, by an anonymous English Navigator, who sailed
 round the World, with Sir *Joseph Banks* and Mr. *Solander*, in the
 years

perpetuating themselves by their families ; whereas more than the half of Mankind is doomed to celibacy. The other half curses the bands which have
 matched

years 1768, 1769, 1770, and 1771, page 83. “ The inhabitants of Otaheite, trade with those of the adjacent islands which lie to the eastward, and which we had discovered on our passage. During three months of the year, the winds which blow from the *West quarter* are very favourable to them for carrying on this traffic.” Admiral *Anson* likewise met with winds from the West, in those Latitudes, which retarded him.

Certain Philosophers explain the correspondencies to be found between the inhabitants of the islands and those of Continents, by supposing islands to be lands once united to the Continent, but now swallowed up by the Ocean, the summit only, and a few of the inhabitants upon it, remaining above the water. But enough has been already said in this Work, to evince that maritime islands are not fragments separated from the Continent, and that they have mountains, peaks, lakes, hills, proportionable to their extent, and directed to the regular winds which blow over their seas. They have vegetables peculiar to themselves, and which no where else attain the same degree of beauty. Farther, had those islands formerly constituted part of our Continent, we should find in them all those of our quadrupeds which are to be met with in all climates ; there were no rats nor mice in America, and in the Antilles, previous to the arrival of the Europeans, if we may believe the testimony of the Spanish Historian *Herrera*, and of Father *du Tertre*. We should, likewise, have found in them the ox, the ass, the camel, the horse, but they contained none of these animals ; but plenty of our common poultry, ducks, dogs, swine, as well as among the Islanders of the South-Sea, who themselves had no other of our domestic animals.

matched him. The greater part tremble at the thought of rearing a progeny, under the apprehension of being incapable to find subsistence for them. The greater part, in order to procure subsistence for themselves, are subjected to painful labours, and reduced to the condition of slaves to their fellow-creatures. Whole Nations are exposed to perish by famine: others, destitute of territory, are piled a-top of each other, while the greatest part of the Globe is a wilderness.

It is obvious that the first animals, such as the horse and the cow, being of a bulk and weight too considerable, could not possibly, be their utility ever so great, cross the seas in the small canoes of the early Navigators, who, on the other hand, would have been very careful not to transport with them such vermin as rats and mice.

Finally, let us revert to the general Laws of Nature. If all the islands of the South-Sea once formed a Continent, there must have been no sea, then, in the space which they occupy. Now, it is indubitably certain, that were you, at this day, to take away from around them, the Ocean by which they are encompassed, and the regular winds which blow over it, you would blast them with sterility. The islands of the South-Sea form, between Asia and America, a real bridge of communication, with a few arches alone of which we are acquainted, and of which it would not be difficult to discover the rest, from the other harmonies of the Globe. But here I restrain my conjectures on this subject. I have said enough to prove, that the same hand which has covered the Earth with plants and animals for the service of Man, has not neglected the different parts of his habitation.

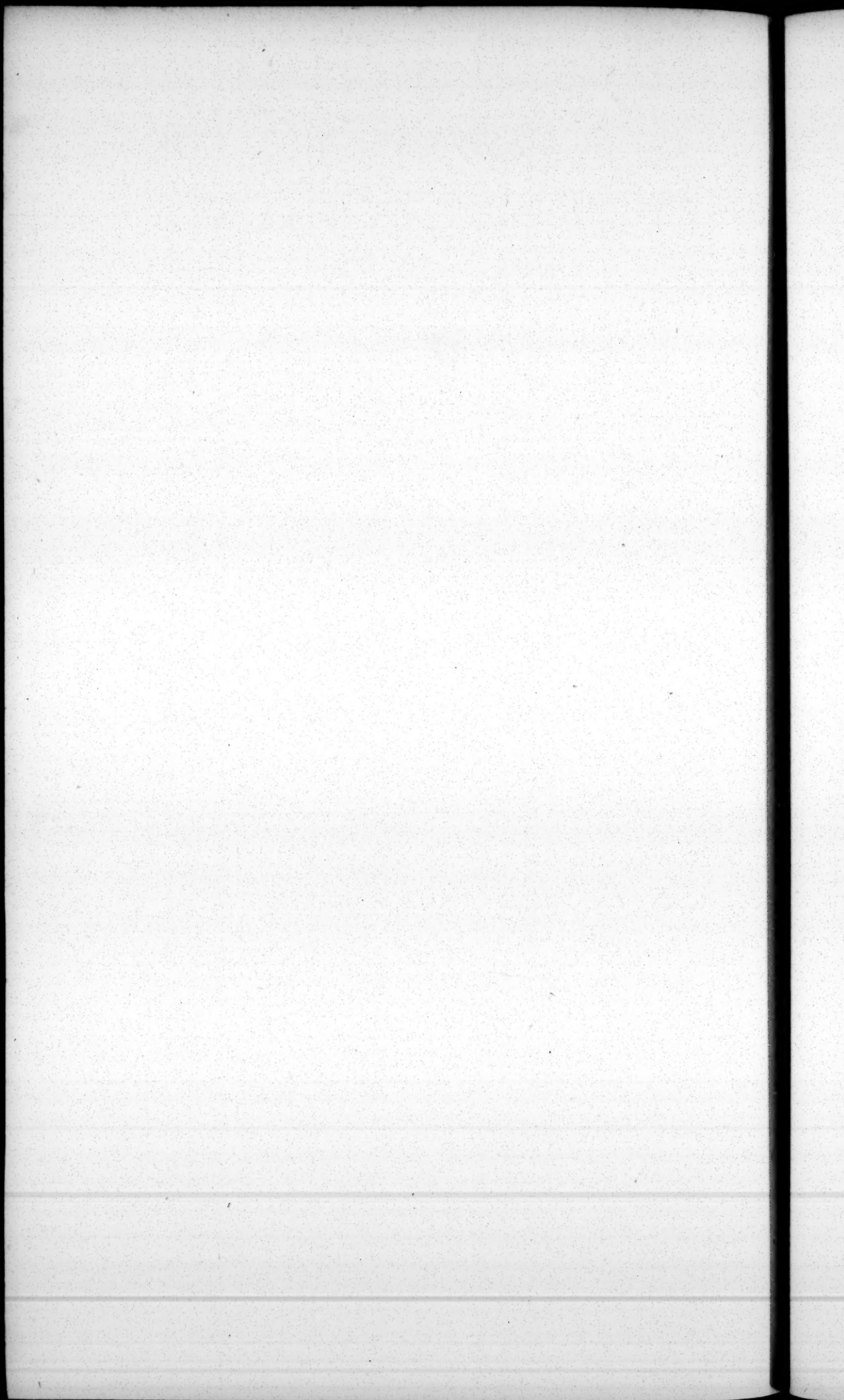
There

There are many lands which never have been cultivated ; but there is not one, known to Europeans, which has not been polluted with human blood. The very solitudes of the Ocean gulp down into their abyſſes, veſſels filled with men, funk to the bottom by the hands of men. In cities, to all appearance ſo flouriſhing by their arts and their monuments, pride and craft, ſuperſtition and impiety, violence and perfidy, are in a ſtate of inceſſant warfare, and keep the wretched inhabitants in perpetual alarm. The more that ſociety is poliſhed in them, the more numerous and cruel are the evils which oppreſs them. Is the induſtry of Man there exerted, only becauſe he is there moſt miſerable ? Why ſhould the Empire of the Globe have been conferred on the ſingle animal which had not the government of it's own paſſions ? How comes it that Man, feeble and tranſitory, ſhould be animated by paſſions at once ferocious and generous, deſpicable and immortal ? How is it that, born without inſtinct, he ſhould have been able to acquire ſuch various knowledge ? He has happily imitated all the arts of Nature, except that of being happy. All the traditions of the Human Race have preſerved the origin of theſe ſtrange contradictions ; but Religion alone unfolds to us the cauſe of them. She informs us that Man is of a different order from

the rest of animals ; that his reason perverted has given offence to the AUTHOR of the Universe ; that as a just punishment, he has been left to the direction of his own understanding ; that he is capable of forming his reason only by the study of universal reason, displayed in the Works of Nature, and in the hopes which virtue inspires ; that by such means alone he can be enabled to rise above the animal, beneath the level of which he is sunk, and to re-ascend, step by step, along the steep declivity of the celestial mountain from which he has been precipitated.

Happy is he, in these days, who, instead of rambling over the World, can live remote from Mankind ! Happy the man who knows nothing beyond the circumference of his own Horizon, and to whom even the next village is an unknown land ! He has not placed his affections on objects which he must never more behold, nor left his reputation at the mercy of the wicked. He believes that innocence resides in hamlets, honour in palaces, and virtue in temples. His glory and his religion consist in communicating happiness to those around him. If he beholds not in his garden the fruits of Asia, or the shady groves of America, he cultivates the plants which delight his wife and children. He has no need of the monuments
of

of Architecture to dignify and embellish his landscape. A tree, under the shade of which a virtuous man is reclined to rest, suggests to him sublime recollections ; the poplar in the forest recalls to his mind the combats of *Hercules* ; and the foliage of the oak reminds him of the crowning garlands of the Capitol.



STUDY TWELFTH.

OF SOME MORAL LAWS OF NATURE.

Weakness of Reason, of Feeling; Proofs of the Divinity and of the Immortality of the Soul from Feeling.

SUCH are the physical proofs of the existence of the DEITY, as far as the feebleness of my reason has enabled me to produce and arrange them. I have collected, perhaps, ten times as many; but I perceived that I was, after all, but at the beginning of my career; that the farther I advanced, the farther it extended itself before me; that my own labour would soon overwhelm me; and that, conformably to the idea of Scripture, nothing would remain to me, after a complete survey of the Works of Creation, but the most profound astonishment.

It

It is one of the great calamities of human life, that in proportion as we approach the source of truth, it flies away from before us; and that when, by chance, we are able to catch some of it's smaller ramifications, we are unable to remain constantly attached to them. Wherefore has the sentiment which yesterday exalted me to Heaven, at sight of a new relation of Nature—wherefore has it disappeared to-day? *Archimedes* did not remain always in an ecstasy, from the discovery of the relations of metals in the crown of King *Hiero*. He after that made other discoveries more congenial to his mind: such as that of the cylinder circumscribed within the sphere, which he gave directions to have engraved on his tomb. *Pythagoras* contemplated, at length, with indifference, the square of the hypotenuse, for the discovery of which he had vowed, it is said, a whole hecatomb of oxen to *Jupiter*. I recollect that when I first became master of the demonstration of those sublime truths, I experienced a delight almost as lively as that of the great men who were the first inventors of them. Wherefore is it extinguished? Why do I this day stand in need of novelties to procure me pleasure? The mere animal is, in this respect, happier than we are: what pleased him yesterday will likewise give him pleasure to-morrow: he fixes for himself a boundary, which he
never

never exceeds ; what is sufficient for him, always appears to him beautiful and good. The ingenious bee constructs commodious cells, but never dreams of rearing triumphal arches, or obelisks, to decorate her waxen city. A cottage was in like manner sufficient for Man, in order to be as well lodged as a bee. What need had he of five orders of Architecture, of pyramids, of towers, of kiosques ?

What, then, is that versatile faculty, called *reason*, which I employ in observing Nature ? It is, say the Schools, a perception of correspondencies, which essentially distinguishes Man from the beast ; Man enjoys reason, and the beast is governed merely by instinct. But if this instinct always points out to the animal what is best adapted to it, it is, therefore, likewise a reason, and a reason more precious than ours, in as much as it is inviolable, and is acquired without the aid of long and painful experience. To this, the Philosophers of the last age replied, that the proof of the want of reason in beasts is this, that they act always in the same manner ; thus they concluded, from the very perfection of their reason, that they had none. Hence we may see to what a degree great names, salaries, and associations, may give currency to the greatest absurdities ; for the argument of those
Philosophers

Philosophers is a direct attack on the Supreme Intelligence itself, which is invariable in its plans, as animals are in their instinct. If bees uniformly construct their cells of the same figure, it is because Nature always makes bees of the same form.

I do not mean, however, to affirm, that the reason of beasts and that of Man is the same : ours is, without dispute, much more extensive than the instinct of each animal in particular ; but if Man is endowed with an universal reason, must it not be because his wants are universal ? He likewise discerns, it is true, the wants of other animals ; but may it not be relatively to himself that he has made this his study ? If the dog gives himself no concern about the oats of the horse, it is, perhaps, because the horse is not subservient to the wants of the dog.

We possess, notwithstanding, natural adaptations peculiar to ourselves, such as the art of agriculture, and the use of fire. The knowledge of these, undoubtedly, would demonstrate our natural superiority, were it not, at the same time, a proof of our wretchedness. Animals are under no necessity to kindle fires, and to cast seed into the ground, as they are clothed and fed by the hand of Nature ; besides, many of them have, in themselves, faculties

ties far superior to our sciences, which are, if the truth were told, foreign to us. If we have discovered some phosphoric substances, the luminous fly of the Tropics has in itself a focus of light, which illuminates it during the night. While we are amusing ourselves in making experiments on electricity, the torpedo is employing it in self-defence: and while the Academies and States of Europe are proposing considerable prizes to the person who shall discover the means of determining the Longitude at Sea, the paillencu and the frigate are every day performing a flight of three or four hundred leagues between the Tropics, from East to West, without ever failing to find, in the evening, the rock from which they took their departure in the morning.

Another mortifying insufficiency presents itself, when Philosophy attempts to employ, in combating the intelligence of Nature, that very reason which can be of no use but to discern it. What plausible arguments, respecting the danger of the passions, the frivolity of human life, the loss of fortune, of honour, of children! You can easily unhouse me, divine *Marcus Aurelius*, and you too, sceptical *Montagne*; but you have not provided for me another home. You put the staff of Philosophy into my hand, and say to me, walk on intrepidly; make the tour of the World, begging
your

your bread ; you are just as happy as we in our villas, with our wives, and respected by all around. But here is an evil of which you had no foresight. I have received, in my country, calumny only, as the reward of all my services ; I have experienced nothing but ingratitude on the part of my friends, and even of my patrons ; I am solitary, and have no longer the means of subsistence ; I am a prey to nervous disorders ; I stand in need of men, but my soul is troubled at the sight of them, while I reflect on the fatal reasons by which they are united, and that there is no possibility of interesting them, but by flattering their passions, and by becoming vicious as they are. What good purpose does it serve to have studied virtue ? It shudders at such recollections, and even without any reflection, merely at the sight of men. The first thing that fails me is that very reason, on which you desire me to lean for support. All your fine logicks vanish, precisely at the moment when I have most need of them. Put a reed into the hand of a sick person : the very first thing that will drop from him, when attacked by a fit of illness, is that same reed ; and if he ventures to rest his whole weight upon it, most probably it will break, and, perhaps run through his hand. Death, you tell me, will cure every thing ; but in order to die, I have no occasion for all this reasoning ; besides, I do not drop, with the vigor of life, into the arms of death,

death, but dying and reasoning no longer, still, however, feeling and suffering *.

* Thus, Religion has greatly the superiority over Philosophy, in as much as it supports us, not by our reason, but by our resignation. She would have us, not on foot, and stirring about, but stretched on a bed of languishing: not on the theatre of the World, but reposing at the footstool of the Throne of God; not tormented with solicitude about futurity, but confident and composed. When books, honours, fortune, and friends forsake us, she presents us, as a pillow for our head, not the recollection of our frivolous and theatrical virtues, but that of our insufficiency; and, instead of the arrogant maxims of Philosophy, she demands of us only calmness, peace, and filial confidence.

I must make one reflection more respecting this reason, or, which amounts to the same thing, respecting this ingenuity of which we are so vain: namely this, that it appears to be the result of our miseries. It is very remarkable, that the Nations which have been most celebrated for their wit, their arts, and their industry, were the most miserable on the face of the Earth, from their government, their passions, or their discords. Read the history of the lives of most men who have been distinguished by the superiority of their intellectual powers, and you will find that they were extremely miserable, especially in their childhood. One-eyed persons, the lame, the hump-backed have, in general, more wit than other men, because, from being more disagreeably conformed, they apply their reasoning powers toward observing with more attention the relations of Society, in the view of screening themselves against it's oppression. Their humour, it is true, is commonly of the farcastic kind, but this character is sufficiently applicable to what passes in the World for wit. Besides, it was not Nature which rendered them malignant, but the raillery, or the contempt, of those with whom they have lived.

What

What is, once more, that reason, of which we boast so triumphantly? As it is nothing more than the relation of objects to our wants, it is reduced, then, to mere personal interest. Hence it is that we have so many family reasons, reasons of associations, reasons of state; reasons of all countries, and of all ages: hence it is, that the reason of a young man is one thing, and that of an old man another; that the reason of a woman differs from that of a hermit, and a soldier's from a priest's. Every body, says the Duke *de la Rochefoucault*, has reason (is in the right). Yes, undoubtedly, and it is because every one has reason, that no one agrees with another.

This sublime faculty farther undergoes, from the first moments of it's expansion, a shock so violent, that it is rendered, in some sort, incapable of penetrating into the field of Nature. I do not speak of our methods and systems, which diffuse false lights over the first principles of human knowledge, by shewing us truth only in books, involved in machinery, and displayed on theatres. I have said something of those obstacles, in the objections which I have ventured to propose against the elements of our Sciences; but the maxims instilled into us from our earliest infancy, *make a fortune, be the first*, are alone sufficient to subvert our
our

our natural reason ; they exhibit to us the just and the unjust, only as they stand related to our personal interests, and to our ambition ; they usually attach us to the fortune of some powerful and reputable corps, and render us, as it may happen, atheists or devotees, debauched or continent, Cartesianians or Newtonians, just as it affects the cause which has become our only moving principle.

Good cause, then, we have to mistrust reason, as, from the very first step, it misleads us in our researches after truth and happiness. Let us enquire, whether there is not in Man some faculty more noble, more invariable, and of greater extent. Though, in prosecuting this enquiry, I have to present only views vague and indeterminate, I hope that men more enlightened than I can pretend to be, may one day fix them, and carry them much farther. In this confidence, with the feeble powers which I possess, I am going to engage in a career, well worthy of the Reader's most serious attention.

Descartes lays this down as the basis of the first natural truths : *I think, therefore I exist*. As this Philosopher has acquired a very high degree of reputation, which he merited, besides, by his knowledge in Geometry, and, above all, by his virtues, his argument in proof of existence has been greatly

extolled, and dignified with the title of axiom. But, if I am not mistaken, this argument labours under an essential defect, in that it has not the generality of a fundamental principle; for it implicitly follows, that when a man does not think, he ceases to exist, or, at least, to have a proof of his existence. It follows farther, that the animal creation, to which *Descartes* denied the power of thought, had no proof that they existed; and that the greatest part of beings are in a state of non-existence with respect to us, in as much as they excite in us simple sensations merely, of forms, of colours, and of movements, without any reference to thought. Besides, the results of human thought having been frequently employed, from their versatility, to suggest doubts respecting the existence of God, and even of our own, as was the case with the sceptic *Pyrrho*; this reasoning, like all the operations of the human understanding, falls under well-grounded suspicion.

I substitute, therefore, in place of the argument of *Descartes*, that which follows, as it appears to me both more simple and more general: *I feel, therefore I exist*. It extends to all our physical sensations, which admonish us much more frequently of our existence than thought does. It has for its moving principle an unknown faculty of the soul, which I call *sentiment*, or mental feeling, to which
thought

thought itself must refer ; for the evidence to which we attempt to subject all the operations of our reason, is itself simply sentiment.

I shall, first, make it appear, that this mysterious faculty differs essentially from physical sensations, and from the relations presented to us by reason, and that it blends itself in a manner constant and invariable in every thing that we do ; so that it is, if I may be allowed the expression, human instinct.

As to the difference of sentiment from physical sensation, it is evident, that *Iphigenia* at the altar gives us an impression of a very different nature from that produced by the taste of a fruit, or by the perfume of a flower ; and as to that which distinguishes it from a process of the understanding, it is certain that the tears and the despair of *Clytemnestra* excite in us emotions of a very different kind from those suggested by a satyr, a comedy, or even, if you will, by a mathematical demonstration.

Not but that reason may sometimes issue in sentiment, when it presents itself with evidence ; but the one is only, with relation to the other, what the eye is with relation to the body, that is, an intellectual vision : besides, mental feeling appears to me

to be the result of Laws of Nature, as reason is the result of political Laws.

I shall give no farther definition of this obscure principle, but I shall render it sufficiently intelligible, if I am so happy as to make it felt. And here I flatter myself with success, by first stating an opposition between it and reason. It is very remarkable that women, who are always nearer to Nature, from their very irregularities, than men with their pretended wisdom, never confound these two faculties, and distinguish the first by the name of sensibility, or sentiment, by way of excellence, because it is, in truth, the source of our most delicious affections. They are continually on their guard against confounding, as most men do, the understanding and the heart, reason and sentiment. The one, as we have seen, is frequently our work; the other is always the work of Nature. They differ so essentially from each other, that if you wish to annihilate the interest of a Work which abounds in sentiment, you have only to introduce an infusion of reasoning.

This is a fault which the most celebrated Writers have committed, in all the ages in which Society completes it's separation from Nature. Reason produces many men of intelligence in ages
pretendedly

pretendedly polished; and sentiment, men of genius, in ages pretendedly barbarous. Reason varies from age to age, and sentiment is always the same. The errors of reason are local and changeable, but the truths of sentiment are invariable and universal. Reason makes the I Greek, the I Englishman, the I Turk; and sentiment, the I Man, and the I Divine. We stand in need, at this day, of commentaries, in order to understand the books of antiquity, which are the works of reason, such as those of most Historians, and Poets, satirical and comic, as *Martial*, *Plautus*, *Juvenal*, and even those of the past age, as *Boileau* and *Moliere*; but none will ever be necessary, in order to be moved by the supplications of *Priam* at the feet of *Achilles*, by the despair of *Dido*, by the tragedies of *Racine*, and the lively fables of *La Fontaine*. We frequently stand in need of many combinations, for the purpose of bringing to light some concealed reason of Nature; but the simple and pure sentiments of repose, of peace, of gentle melancholy, which she inspires, come to us without effort.

Reason, I grant, procures for us pleasures of a certain kind; but if she discovers to us some small portion of the order of the Universe, she exhibits to us, at the same time, our own destruction, attached to the Laws of it's preservation; she pre-

sents to us, at once, the evils which are past, and those which are to come; she furnishes arms to our passions, at the very time when she is demonstrating to us their insufficiency. The farther that she carries us, the more are the proofs which she accumulates, when we come back to ourselves, of our own nothingness; and, so far from soothing our pains by her researches, she frequently aggravates them bitterly by the discoveries which she makes. Sentiment, on the contrary, blind in its desires, embraces the monuments of all countries, and of all ages; it is soothed to a delicious complacency, in the midst of ruins, of combats, and of death itself, in contemplating an undescribable eternal existence; it pursues, in all its appetites, the attributes of Deity, infinity, extension, duration, power, grandeur, and glory; it mingles the ardent desires of these with all our passions; it thus communicates to them a certain sublime impulse; and, by subduing our reason, itself becomes the most noble, and the most delicious instinct of human life.

Sentiment demonstrates to us, much better than reason, the spirituality of the soul; for reason frequently proposes to us, as an end, the gratification of our grossest passions*, whereas sentiment is ever

* Listen to the voice of reason, is the incessant admonition of our moral Philosophers. But do they not perceive that they are putting

pure in it's propensities. Besides, a great many natural effects which escape the one, are under the control of the other; such is, as has been observed, evidence itself, which is merely a matter of feeling, and over which reflection exercises no constraint; such, too, is our own existence. The proof of it is not in the province of reason; for, why is it that I exist? where is the reason of it? But I feel that I exist, and this sentiment is sufficient to produce conviction.

This being laid down, I proceed to demonstrate, that there are two powers * in Man, the one animal,

putting us into the hand of our greatest enemy? Has not every passion a reason at command?

* It is from want of attention to those two powers, that so many celebrated performances, on the subject of Man, present a false colouring. Their Authors sometimes represent him to us as a metaphysical object. You would be tempted to think that the physical wants, which stagger even the Saints, are only feeble accessories of human life. They compose it merely of monads, of abstractions, and of moralities. Others discern nothing in man but an animal, and distinguish in him only the coarsest grossness of sense. They never study him without the dissecting knife in their hand, and when he is dead, that is to say, when he is man no longer. Others know him only as a political individual: they perceive him only through the medium of the correspondencies of ambition. It is not Man that interests them; it is a Frenchman, an Englishman, a Prelate, a Gentleman. *Homer* is the only Writer, with whom I am acquainted, who has

mal, and the other intellectual, both of an opposite nature, and which, by their union, constitute human life ; just as the harmony of every thing on the Earth is composed of two contraries.

Certain

painted Man complete : all others, the best not excepted, present nothing but a skeleton of him. The *Iliad* of *Homer*, if I may be allowed to judge, is the painting of every Man, as it is that of all Nature. All the passions are there, with their contrasts and their shades, the most intellectually refined, and the most sensually gross. *Achilles* sings the praises of the Gods to the sound of his lyre, and tends the cookery of a leg of mutton in a kettle. This last trait has given grievous offence to our theatrical writers, who deal in the composition of artificial heroes, namely, such as disguise and conceal their first wants, as their authors themselves disguise their own to Society. All the passions of the human breast are to be found in the *Iliad* : furious wrath in *Achilles*, haughty ambition in *Agamemnon*, patriotic valour in *Hector* ; in *Nestor*, unimpassioned wisdom ; in *Ulysses*, crafty prudence ; calumny in *Thersites* ; voluptuousness in *Paris* ; faithless love in *Helen* ; conjugal love in *Andromache* ; paternal affection in *Priam* ; friendship in *Patroclus* ; and so on : and besides all this, a multitude of intermediate shades of all these passions, such as the inconsiderate courage of *Diomedes*, and that of *Ajax*, who dared to challenge the Gods themselves to the combat : then the oppositions of situation and of fortune which detach those characters ; such as a wedding, and a country festival, depicted on the formidable buckler of *Achilles* ; the remorse of *Helen*, and the restless solicitude of *Andromache* ; the flight of *Hector*, on the point of perishing under the walls of his native city, in the sight of his people, whose only defender he was ; and the peaceful objects presented to him at that tremendous moment, such as the grove of trees, and the fountain to which the Trojan
young

Certain Philosophers have taken pleasure in painting Man as a God. His attitude, they tell us, is that of command. But, in order to his having

young women were accustomed to resort, to wash their robes, and where they loved to assemble in happier days.

This divine Genius, having appropriated to his heroes a leading passion of the human heart, and having put it in action in the most remarkable phases of human life, has allotted, in like manner, the attributes of God to a variety of Divinities, and has assigned to them the different kingdoms of Nature ; to *Nep-tune*, the Ocean : to *Pluto*, the infernal regions ; to *Juno*, the air ; to *Vulcan*, the fire ; to *Diana*, the forests ; to *Pan*, the flocks ; in a word, the Nymphs, the Naiads, nay, the very Hours, have all a certain department on the Earth. There is not a single flower but what is committed to the superintendence of some Deity. It is thus that he has contrived to render the habitation of Man celestial. His Work is the most sublime of Encyclopedias. All the characters of it are so exactly in the human heart, and in Nature, that the names by which he has designed them have become immortal. Add to the majesty of his plans a truth of expression, which is not to be ascribed alone to the beauty of his language, as certain Grammarians pretend, but to the vast extent of his observation of Nature. It is thus, for example, that he calls the Sea *impurpled*, at the moment that the Sun is setting ; because that then the reflexes of the Sun in the Horizon render it of that colour, as I myself have frequently remarked. *Virgil*, who has imitated him closely, abounds in these beauties of observation, to which Commentators pay very little, if any, attention. In the *Georgics*, for instance, *Virgil* gives to the Spring the epithet of *blushing* ; *vere rubenti*, says he. As his Translators and Commentators have taken no pains to convey this, any more than a multitude of similar touches, I was long impressed

having the air of command, it is necessary that other men should have that of submission, without which he would find an enemy in every one of his equals. The natural empire of Man extends only to animals ; and in the wars which he wages with them, or in the care which he exercises over them, he is frequently constrained to drop his attitude of emperor, and to assume that of a slave.

Others represent Man as the perpetual object of vengeance to angry Heaven, and have accumulated on his existence, all the miseries which can render it odious to him. This is not painting Man. He is not formed of a simple nature, like other animals, each species of which invariably preserves it's proper character ; but of two opposite natures, each of which is itself farther subdivided into several passions, which form a contrast. In virtue of one of these natures, he unites in himself all the wants, and all the passions of animals ; and in virtue of the other, the ineffable sentiments of the Deity. It is to this last instinct, much

impressed with the belief that this epithet was introduced merely to fill up the measure of the verse : but having remarked that, early in Spring, the shoots and buds of most trees assumed a ruddy appearance, previously to throwing out their leaves, I thence was enabled to comprehend what was the precise moment of the season which the Poet intended to describe by *vere rubenti*.

more

more than to his reflective powers, that he is indebted for the conviction which he has of the existence of God; for I suppose, that having, by means of his reason, the faculty of perceiving the correspondencies which exist between the objects of Nature, he found out the relations which subsist between an island and a tree, a tree and a fruit, a fruit and his own wants; he would readily feel himself determined, on seeing an island, to look for food upon it: but his reason, in shewing him the links of four natural harmonies, would not refer the cause of them to an invisible Author, unless he had the sentiment of it deeply impressed on his heart. It would stop short at the point where his perceptions stopped, and where those of animals terminate. A wolf which should swim over a river, in order to reach an island on which he perceived grass growing, in the hope of there finding sheep likewise, has an equal conception of the links which connect the four natural relations of the island, the grass, the sheep, and his own appetite: but he falls not down prostrate before the intelligent Being who has established them.

Considering Man as an animal, I know of no one to be compared with him in respect of wretchedness. First of all, he is naked, exposed to insects, to the wind, to the rain, to the heat, to the cold, and laid under the necessity, in all countries,
of

of finding himself clothing. If his skin acquires, in time, sufficient hardness to resist the attacks of the elements, it is not till after cruel experiments, which sometimes slay him from top to toe. He knows nothing naturally, as other animals do. If he wants to cross a river, he must first learn to swim; nay, he must, in his infancy, be taught to walk and to speak*. There is no country so happily situated, in which he is not obliged to prepare his food with considerable care and trouble. The banana and the bread-fruit tree give him between the Tropics, provisions all the year round; but then he must plant those trees, he must enclose them within thorny fences, to preserve them from the beasts; he must dry part of the fruits, for a supply during the hurricane season; and must build repositories in which to lay them up. Besides, those useful vegetables are reserved for certain privileged islands alone; for over the rest of the Earth, the culture of alimentary grains and roots requires a great multitude of arts and preparations. Suppose him to have collected around him every blessing his heart can desire, the love and the pleasure which flow from abundance, avarice, thieves, the incursions of the enemy, disturb his enjoyment. He must have Laws, Judges,

* The very name of infant is derived from the Latin word *infans*, that is to say, one who cannot speak.

magazines, fortresses, confederacies, and regiments, to protect from without, and from within, his ill-fated corn-field. Finally, when it is in his power to enjoy with all the tranquility of a sage, languor takes possession of his mind; he must have comedies, balls, masquerades, amusements to prevent him from reasoning with himself.

It is impossible to conceive how a Nation could exist with the animal passions simply. The sentiments of natural justice, which are the basis of legislation, are not the results of our mutual wants, as has been by some pretended. Our passions are not retrogressive; they have ourselves alone for their centre. A family of savages, living in the midst of plenty, would be no more concerned about the misery of their neighbours perishing for want, than we concern ourselves at Paris, that our sugar and coffee are costing Africa rivers of tears.

Reason itself, united to the passions, would only stimulate their ferocity; for it would supply them with new arguments, long after their desires were gratified. It is, in most men, nothing more than the relation between beings and their wants, that is, their personal interest. Let us examine the effect of it, combined with love and ambition, the two tyrants of human life.

Let

Let us first suppose a state entirely governed by Love, such as that on the banks of the Lignon, imagined by the ingenious *d'Urfeius*. I beg leave to ask, Who would be at the trouble of building houses there, and of labouring the ground? Must we not suppose, that such a country would contain servants, whose industry should compensate the idleness of their masters? Will not these servants be reduced to the necessity of abstaining from making love, in order that their masters may be incessantly employed in it? Besides, In what manner are the old people of both sexes to pass their time? A fine spectacle for them truly, to behold their children always indulging in the dalliance of the tender passion! Would not such a spectacle become to them a perpetual source of regret, of ill-humour, of jealousy, as it is among those of our own country? Such a government, in truth, were it even in the islands of the South-Sea, under the groves of the cocoa and bread-fruit trees, where there was nothing to do but to eat and make love, would soon be torn with discord, and oppressed with languor.

But, on the supposition that the principle of *social reason* were to oblige every family to labour each for it's own support, and to introduce more variety into their way of living, by inviting to it our arts and sciences; it would quickly accelerate
their

their destruction. We must by no means depend on ever hearing there any of those affecting dialogues which *d'Urfeius* puts into the mouth of *Astræa* and *Celadon*; they are dictated neither by animal love, nor by enlightened reason. Both of these employ a very different logic. When a lover, illuminated there with the science which he had borrowed of us, wished to inspire his mistress with a mutual passion, if, however, it were needful to employ discourse in order to accomplish this, he would talk to her of springs, of masses, of attractions, of fermentations, of the electric spark, and of the other physical causes which determine; according to our modern systems, the propensities of the two sexes, and the movements of the passions. *Political reasons* would interpose, and affix the seal to their union, by stipulating, in the melancholy and mercenary language of our contracts, for dowries, maintenances, redemptions, pin-monies, post-obits. But the *personal reason* of each contracting party would quickly separate them. As soon as a man saw his wife overtaken with disease, he would say to her: "My temperament calls for a wife who enjoys health, and constrains me to abandon you." She would answer him, undoubtedly, in order to preserve consistency: "You do well to obey the dictates of Nature. I should, in like manner, have looked out for another husband, had you been in my place." A son would say

say to his aged and declining father : “ You begot me for your pleasure, it is time that I should live for mine.” Where should we find citizens disposed to unite for maintaining the laws of such a Society ; the soldiers disposed to meet death in defence of it, and the magistrate who would undertake to govern it ? I say nothing of an infinite number of other disorders, which follow in the train of that blind and headstrong passion, even when directed by cool and dispassionate reason.

If, on the other hand, a Nation were under the dominion of ambition solely, it would come still sooner to destruction ; either from external enemies, or by means of it's own citizens. It is, first, difficult to imagine how it could be reduced to form, under the authority of one Legislator, for, how can we conceive the possibility of ambitious men voluntarily submitting to another man ? Those who have united them, as *Romulus*, *Mahomet*, and all founders of Nations, have commanded attention and obedience only by speaking in the name of the DEITY. But supposing this union, by whatever means, accomplished, could such an association ever be happy ? Let Historians extol conquering Rome ever so highly, Is it credible that her citizens then deserved the appellation of fortunate ? While they were spreading terror over the Globe, and causing floods of tears to flow,
were

were there at Rome no hearts oppressed with terror, and no eye overflowing, for the loss of a son, of a father, of a husband, of a lover? Were the slaves, who constituted by far the greatest part of her inhabitants, were they happy? Was the General of the Roman army himself happy, crowned with laurels as he was, and mounted on a triumphal car, around which, in conformity to a military Law, his own soldiers were singing songs, in which his faults were exposed, to prevent his waxing proud, and forgetting himself? And when Providence permitted *Paulus Emilius* to triumph over a King of the Macedonians, and his poor children, who stretched out their little hands to the Roman People, to excite compassion, it was so ordered, that the conqueror should, at that very season, suffer the loss of his own children, that no one man might be allowed to triumph with impunity over the tears of Mankind.

This very People, however, so disposed to pursue their own glory, through the calamities of others, were obliged, in order to dissemble the horror of it, to veil the tears of the Nations with the interest of the Gods, as we disguise with fire the flesh of the animals which is to serve us for food. Rome, following the order of destiny, was to become, at length, the capital of the World. She armed her ambition with a *celestial reason*, in order

to render her victorious over powers the most formidable, and to curb by means of it the ferocity of her own citizens, by inuring them to the practice of sublime virtue. What would they have become, had they given themselves up, without restraint to that furious instinct? They would have resembled the savages of America, who burn their enemies alive, and devour their flesh still streaming with blood. This Rome at last experienced, when her Religion presented no longer any thing to her enlightened inhabitants, except unmeaning imagery. Then were seen the two passions natural to the heart of Man, ambition and love, inviting to a residence within her walls, the luxury of Asia, the corruptive arts of Greece, proscriptions, murders, poisonings, conflagrations, and giving her up a prey to barbarous Nations. The Theutates of the Gauls then issuing from the forests of the North, and arriving at the Capitol, made the Roman *Jupiter* to tremble in his turn.

Our *reasons of state* are, in modern times, less sublime, but are not for that less fatal to the repose of Mankind, of which a judgment may be formed by the wars of Europe, which are continually disturbing that of the Globe. A Nation delivered up to its passions, and to simple *reasons of state*, would speedily accumulate upon itself all the miseries incident to humanity; but Providence has
implanted

implanted in the breast of Man a sentiment which serves as a counterbalance to the weight of these, by directing his desires far beyond the objects of this World; the sentiment I mean is that of the existence of the DEITY. Man is not Man, because he is a reasoning animal, but because he is a religious animal.

It is remarked by *Cicero* and *Plutarch*, that there was not a single People known up to their time, among whom there were no traces of religion to be found. The sentiment of DEITY is natural to Man. It is that illumination which *St. John* denominates *the true Light, which lighteth every Man that cometh into the World*. I find great fault with certain modern Authors, and even some of them Missionaries, for having asserted, that certain Nations were destitute of all sense of DEITY. This is, in my apprehension, the blackest of calumnies with which a Nation can be branded, because it, of course, entirely strips them of the existence of every virtue; and if such a Nation betrays any appearance of virtue, it can be only under the impulse of the most abominable of vices, which is hypocrisy: for there can be no virtue distinct from Religion. But there is not a single one of those inconsiderate Writers, who does not, at the same time, himself furnish the means of refuting his own imputation; for some of them acknowledge,

that these very atheistical Nations, on certain days, present homage to the Moon ; or that they retire into the woods, to perform certain ceremonies, the knowledge of which they carefully conceal from strangers.

Father *Gobien*, among others, in his History of the Mariannes Islands, after having affirmed, that their inhabitants had no knowledge of any Deity, and discovered not the slightest idea of Religion, tells us immediately after, that they practise invocation of the dead, to whom they give the appellation of *anitis*, whose skulls they preserve in their houses, and to which they ascribe the power of controlling the elements, of changing the seasons, and of restoring health : that they are persuaded of the immortality of the soul, and acknowledge a Paradise and a Hell. Such opinions clearly demonstrate that they have ideas of DEITY.

All Nations have the sentiment of the existence of God ; not that they all raise themselves to Him, after the manner of a *Newton* and a *Socrates*, in contemplation of the general harmony of his Works, but by dwelling on those of his benefits which interest them the most. The Indian of Peru worships the Sun ; he of Bengal, the Ganges, which fertilizes his plains ; the black Iolof, the Ocean, which cools his shores : the Samoïède of the

the North, the rein-deer which feeds him. The wandering Iroquois demands of the Spirits, which preside over the lakes and the forests, plentiful fishing and hunting seasons. Many Nations worship their Kings. There is not one of them which, in order to render more dear to men those august dispensers of their felicity, have not called in the intervention of some Divinity for the purpose of consecrating their origin. Such are, in general, the Gods of the Nations: but when the passions interpose, and darken among them this divine instinct, and blend with it either the madness of ambition, or the seduction of voluptuousness, you behold them prostrating themselves before serpents, crocodiles, and other gods, too abominable to be mentioned. You behold them offering in sacrifice, the blood of their enemies and the virginity of their daughters. Such as is the character of a People, such is it's religion. Man is carried along by this celestial impulse so irresistibly, that, when he ceases to take the DEITY for his model, he never fails to make one after his own image.

There are, therefore, two powers in Man, the one animal, the other divine. The first is incessantly giving him the sentiment of his wretchedness; the second, constantly awakening in him that of his own excellence: and from their con-

licts are produced the varieties and the contradictions of human life.

By means of the sentiment of our wretchedness it is, that we become alive to every thing which presents to us the idea of asylum and protection, of ease and accommodation. Hence it is that most men cherish the thought of calm retreats, of abundance, and of all the blessings which bountiful Nature has provided, on the Earth, to supply our wants. It is this sentiment which gave to Love the chains of *Hymen*, in order that man might one day find the companion of his pains in that of his pleasures; and that children might be ensured of the assistance of their parents. It is this which renders the warm and easy tradesman so eager after relations of court-intrigues, of battles, and descriptions of tempests, because dangers external and distant increase internal happiness and security. This sentiment frequently mingles with the moral affections: it looks for support in friendship, and for encouragement in commendation. It is this which renders us attentive to the promises of the ambitious man, when we are eager to follow him, like slaves, seduced by the ideas of protection with which he amuses us. Thus the sentiment of our wretchedness is one of the most powerful bonds of political society, though it attaches us to the Earth.

The

The sentiment of Deity impels us in a contrary direction *. It was this which conducted Love to the altar, and dictated to the lips of the Lover the first vows of fidelity ; it devoted the first children to Heaven, while as yet there was no such thing as political Law ; it rendered Love sublime, and Friendship generous ; with one hand it succoured the miserable, and opposed the other to tyrants ; it became the moving principle of generosity, and of every virtue. Satisfied with the consciousness of having deserved well of Mankind, it nobly disdained the recompence of applause. When it shewed itself in arts and sciences, it became the ineffable charm which transported us in contemplating them : the moment it withdrew from them, languor succeeded. It is this sentiment which

* Whenever any one has lost this first of harmonies, all the others follow it. Does it not well deserve to be remarked, that all the Writings of Atheists are insufferably dry and uninteresting ? They sometimes fill you with astonishment, but never do they touch the heart. They exhibit caricatures only, or gigantic ideas. They are totally destitute of order, of proportion, of sensibility. I do not exempt from this censure any one, except the poem of *Lucretius*. But this very exception, as has been said before, only confirms the truth of my observation ; for when this Poet wished to please, he found himself under the necessity of introducing Deity, as is evident from his exordium, which commences with that beautiful apostrophe ; *Alma Venus*, &c. Every where else, when he sets about a display of the Philosophy of *Epicurus*, his insipidity becomes absolutely insupportable.

confers immortality on the men of genius who discover to us, in Nature, new relations of intelligence.

When these two sentiments happen to cross each other, that is, when we attach the divine instinct to perishable objects, and the animal instinct to things divine, our life becomes agitated by contradictory passions. This is the cause of those innumerable frivolous hopes and fears with which men are tormented. My fortune is made, says one, I have enough to last me *for ever*; and tomorrow he drops into the grave. How wretched am I! says another, I am undone *for ever*; and death is at the door to deliver him from all his woes. We are bound down to life, said *Michael Montaigne*, by the merest toys; by a glass: yes, and wherefore? Because the sentiment of immortality is impressed on that glass. If life and death frequently appear insupportable to men, it is because they associate the sentiment of their end with that of death, and the sentiment of infinity with that of life. Mortals, if you wish to live happy, and to die in composure, do not let your Laws offer violence to those of Nature. Consider, that, at death, all the troubles of the animal come to a period; the cravings of the body, diseases, persecutions, calumnies, slavery of every kind, the rude combats of a man's passions with himself, and with
others,

others. Consider, that, at death, all the enjoyments of a moral being commence; the rewards of virtue, and of the lightest acts of justice and of humanity, undervalued, perhaps, or despised by the World, but which have, in some measure, brought us nearer, while we were upon the Earth, to a Being righteous and eternal.

When these two instincts unite, in the same place, they confer upon us the highest pleasure of which our nature is susceptible; for, in that case, our two natures, if I may thus express myself, enjoy at once*. I am going to trace a slight sketch of the combination of their harmonies; after which we shall pursue the track of the celestial sentiment which is natural to us, as manifested in our most ordinary sensations.

Let me suppose you then, Reader, disgusted, and wearied out with the disorders of Society, in search of some happy spot toward the extremity of Africa, on which the foot of European never

* To these two instincts may be referred all the sensations of life, which frequently seem to be contradictory. For example, if habit and novelty be agreeable to us, it is that habit gives us confidence respecting our physical relations, which are always the same; and novelty promises new points of view to our divine instinct, which is ever aiming at the extension of its enjoyments.

alighted. Sailing along the Mediterranean, your vessel is tossed by the violence of the tempest, and shipwrecked upon a rock, just as it is beginning to grow dark. Through the favour of Heaven you scramble safe to land: you flee for shelter to a grotto, rendered visible by the glare of the lightning, at the bottom of a little valley. There, retired to the covert of this asylum, you hear, all night long, the thunder roaring, and the rain descending in torrents. At day-break, you discover behind you an amphitheatre of enormous rocks, perpendicularly steep as a wall. From their bases, here and there, start out clumps of fig-trees, covered over with white and purple fruit, and tufts of carobs loaded with brown pods; their summits are crowned with pines, wild olive-trees, and cypresses bending under the violence of the winds. The echos of these rocks repeat, in the air, the confused howling of the tempest, and the hoarse noise of the raging Sea, perceptible to the eye at a distance. But the little valley where you are, is the abode of tranquillity and repose. In its mossy declivities the sea-lark builds her nest, and on these solitary strands the mavis expects the ceasing of the storm.

By this time the first fires of *Aurora* are lengthening over the flowery stachys, and the violet beds of thyme which clothe the swelling hillocks. The
brightening

brightening rays disclose to view, on the summit of an adjoining eminence, a cottage overshadowed with trees. Out of it issue a shepherd, his wife, and his daughter, who take the path that leads to the grotto, with vases and baskets on their heads. It is the spectacle of your distress which attracts these good people toward you. They are provided with fire, fruits, bread, wine, clothing, for your relief. They vie with each other in rendering you the offices of hospitality. The wants of the body being satisfied, those of the mind begin to call for gratification. Your eye eagerly wanders along the surface of the deep, and you are enquiring within yourself, "On what part of the " World am I thrown?" The shepherd perceives your anxiety, and removes it, addressing you in these words: "That distant island which you see " to the North, is Mycone. There is Delos, a " little to the left, and Paros directly in front. " That in which we are is Naxos; you are on " that very part of the island where *Ariadne* was " formerly abandoned by *Theseus*. It was on that " long bank of white sand, which projects below " into the Sea, that she passed the days, with her " eyes rivetted on that point of the Horizon where " the vessel of her faithless lover at length ceased " to be visible; and into this very grotto, where " you now are, she retired, at night, to mourn " over his departure. To the right, between these

" two

“ two little hills, on the top of which you behold
“ some confused ruins, stood a flourishing city,
“ named Naxos. It's female inhabitants, touched
“ with the misfortunes of the daughter of *Minos*,
“ resorted hither, to look for her, and to comfort
“ her. They endeavoured, at first, to divert her
“ attention by amusing conversation ; but nothing
“ could give her pleasure, but the name, and the
“ recollection, of her beloved *Theseus*. These dam-
“ sels then counterfeited letters from that Hero,
“ breathing the tenderest affection, and addressed
“ to *Ariadne*. They flew to deliver them to her,
“ and said, Take comfort, beautiful *Ariadne*.
“ *Theseus* will soon return : *Theseus* thinks of no-
“ thing but you. *Ariadne*, in an extasy of delight,
“ read the letters, and, with a trembling hand,
“ hastened to answer them. The Naxian girls
“ took charge of her answers, and promised to
“ have them speedily conveyed to *Theseus*. In
“ this manner they amused her grief. But when
“ they perceived that the sight of the Sea plunged
“ her more and more into melancholy, they decoyed
“ her into those extensive groves which you observe
“ below in the plain. There they invented every
“ species of festivity, that could lull her fond re-
“ gret to rest. Sometimes they formed around her
“ choral dances, and represented, by the linking
“ of their hands, the various windings of the la-
“ byrinth of Crete, out of which, by her aid,
“ escaped

“ escaped the happy *Theseus* : sometimes they af-
“ fected to put to death the terrible *Minotaur*,
“ The heart of *Ariadne* expanded to the percep-
“ tion of joy, at the sight of representations which
“ called to her remembrance the power of her fa-
“ ther, the glory of her lover, and the triumph of
“ her own charms, which had repaired the destiny
“ of Athens : but when the winds conveyed to
“ her ear, through the music of the tabor and of
“ the flute, the distant noise of the billows break-
“ ing on the shore from which she saw the cruel
“ *Theseus* take his departure, she turned her face
“ toward the Sea, and began to weep. Thus the
“ Naxians were made sensible, that unfortunate
“ love can find, in the very lap of gaiety, the
“ means of embittering it's anguish ; and that the
“ recollection of pain is to be lost, only by losing
“ that of pleasure. They endeavoured, therefore,
“ to remove *Ariadne* from scenes and sounds
“ which were continually recalling the idea of her
“ lover. They persuaded her to visit their city,
“ where they provided for her magnificent ban-
“ quets, in superb apartments, raised on columns
“ of granite. Into these, no male was permitted
“ to enter, and no noise from without could make
“ itself heard. They had taken care to cover the
“ pavement, the walls, the doors, and the win-
“ dows, with the richest tapestry, on which were
“ represented meadows, vineyards, and enchanting
“ solitudes.

“solitudes. A thousand lamps and torches daz-
“zled the eye. They made *Ariadne* seat herself
“in the midst of them on cushions; they placed
“a coronet of ivy, with it’s black clusters, upon
“her flaxen hair, and around her pale forehead;
“then they arranged, at her feet, urns of alabaster
“replenished with the choicest wines; they poured
“them out into cups of gold, which they pre-
“sented to her, saying; Drink, lovely daughter
“of *Minos*; this island produces the richest pre-
“sents of *Bacchus*. Drink, wine dissipates care.
“*Ariadne*, with a smile, suffered herself to be per-
“suaded. In a little time, the roses of health
“re-appeared on her countenance, and a report
“was immediately spread over *Naxos*, that *Bac-*
“*chus* was come to the relief of the mistress of
“*Theseus*. The inhabitants, transported with joy,
“reared a temple to that God, of which you still
“see some columns and the frontispiece, on that
“rock, in the midst of the waves. But wine only
“added fuel to the love of *Ariadne*. She gradu-
“ally pined away, a victim to her sad regrets, and
“even to her fond hopes. See there, at the ex-
“tremity of this valley, on a little hillock, co-
“vered with marine-wormwood, is her tomb, and
“her statue still looking toward the Sea. You
“can scarcely now distinguish in it the figure of a
“female; but there is even now discernible in it
“the restless attitude of a lover. This monument,

“as

“ as well as every other of the country, have been
“ mutilated by time, and still more by the hand
“ of barbarians ; but the memory of suffering vir-
“ tue is not, on the Earth, at the mercy of tyrants.
“ The tomb of *Ariadne* is in possession of the
“ Turks, and her crown is planted among the
“ stars. As for us, escaped from the notice of the
“ powers of this World, by means of our very
“ obscurity, we have, through the goodness of
“ Heaven, found liberty at a distance from the
“ Great, and happiness in a desert. Stranger, if
“ you are still capable of being affected by the
“ blessings of Nature, it is in your power to share
“ them with us.”

At this recital, the gentle tears of humanity trickle down the cheeks of his spouse, and of his youthful daughter, as she breathes a sigh to the memory of *Ariadne* ; and I greatly doubt, whether an Atheist himself, who acknowledges nothing else in Nature but the Laws of matter and of motion, could be insensible to those present correspondencies, and those ancient recollections.

Voluptuous men ! Greece alone, you tell me, presents scenes and points of view so tenderly affecting. *Ariadne*, accordingly, has a place in every garden ; *Ariadne* presents herself to view in every collection of painting. From the turret of
your

your own castle, throw your eye over the plains below. As the prospect gradually extends, it terminates in a Horizon much more beautiful than those of desolated Greece. Your apartment is more commodious than a grotto, and your sofas much softer than the turf. The undulation, and the murmuring sound of your flowery meadows are more grateful to the sense than those of the billows of the Mediterranean. Your money and your own gardens can supply you with greater variety of the choicest wines and fruits than all the islands of the Archipelago could produce. Would you blend with these delights that of Deity? Behold on yonder hill, that small parish-church, encircled by aged elms. Among the young women who there assemble, under its rustic portico, there may be, undoubtedly, some forlorn *Ariadne*, betrayed by a faithless lover *. She is not made of marble.

* There are, in our own plains, young females much more respectable than *Ariadne*, to whom our Historians, who make such a parade of virtue, pay no manner of attention. A person of my acquaintance observed one Sunday, at the gate of a country-church, a young woman at prayer, quite alone, while they were chanting vespers within. As he remained some time in the place, he observed, for several Sundays successively, that same young woman, who never once entered the church during the service. Being mightily struck with this singularity of behaviour, he enquired into the meaning of it at some others of the female peasants, who answered him, that it must be her own will

marble, but of living flesh and blood; she is not a Greek, but a French-woman; she is not comforted, but insulted by her companions. Visit her humble abode, and soothe her anguish. Do good in this life, which is passing away with the rapidity of a torrent. Do good, not out of ostentation, and by the hands of a stranger; but for the sake of Heaven, and with your own hand. The fruit of virtue loses its flavour, when gathered by another, and not yourself. Ah! if you would, in person, speak an encouraging word to her, under that load of depression; if, by your sympathy, you raise her in her own esteem, you will perceive how, under a sense of your goodness, her forehead is overspread with a blush, her eyes suffused with tears, her convulsive lips move without speaking, and her heart, long oppressed with shame, expand to the approach of a comforter, as to the sentiment of the DEITY.

will merely that determined her to stop at the porch, as they knew of nothing that should prevent her going in, adding, that they had frequently urged her to accompany them, but in vain. At last, desirous of having the solution of this mystery, he addressed himself to the young woman herself, whose conduct appeared to him so very extraordinary. She appeared, at first, somewhat disconcerted, but presently collecting courage, "Sir," said she, "I had a lover who took advantage of my frailty. I became pregnant, and my lover falling sick, died, without making me his wife. It is my desire, that a voluntary exclusion from church for life should serve as some atonement for my fault, and as a warning to my companions."

You will then perceive, in the human figure, touches far beyond the reach of the chisels of Greece, and the pencil of a *Van Dyk*. The felicity of an unfortunate young woman will cost you much less than the statue of *Ariadne*: and instead of giving celebrity to the name of an artist in your hotel, for a few years, this will immortalize your own, and cause it to last, long after you are gone from hence, every time she says to her companions and to her children: "It was a God, who came to succour me in the day of my distress."

We now proceed to trace the instinct of Divinity in our physical sensations, and shall conclude this Study, by the sentiments of the soul which are purely intellectual. Thus we shall attempt to convey a faint idea of the nature of Man.

OF PHYSICAL SENSATIONS.

All the physical sensations are, in themselves, so many testimonies of our misery. If Man is so sensible to the pleasure of the touch, it is because he is naked all his body over. He is under the necessity, in order to clothe himself of stripping the quadruped, the plant, and the worm. If almost all vegetables and animals are laid under contribution to supply him with food, it is because he is obliged to employ

ploy a great deal of cookery, and many combinations, in preparing his aliments. Nature has treated him with much severity ; for he is the only one of animals, for the wants of which she has made no immediate provision. Our philosophers have not sufficiently reflected on this perplexing distinction. How ! a worm provided with it's auger or it's file ; he enters into life in the midst of a profusion of fruit proper for his subsistence ; he, by and by, finds in himself the means of spinning and weaving his own garment ; after that, he transforms himself into a gaudy butterfly, who ranges uncontroled, abandoning himself to all the delights of love, and re-perpetuating his species without anxiety, and without remorse ; whereas the son of a King is born completely naked, amidst tears and groans, standing in need, all his life long, of the assistance of another ; under the necessity of maintaining an unremitting conflict with his own species, from within, or from without, and frequently finding in himself his most formidable enemy ! Of a truth, unless we are all the children of dust, it would be a thousand times better to enter upon existence under the form of an insect, than under that of an Emperor. But Man has been abandoned to the most abject misery, only that he may have uninterrupted recourse to the first of Powers.

Of the Sense of Tasting.

There is no one physical sensation but what awakens in Man some sentiment of the DEITY.

To begin with the grossest of all our senses, that which relates to eating and drinking; all Nations, in the savage state, have entertained the belief that the DIVINITY had need to support his life, by the same means that men do: hence, in all religions, the origin of sacrifice. Hence, also, has farther proceeded, in many Nations, the custom of placing viands on the tombs of the dead. The wives of the American savages extend this mark of solicitude even to infants who die upon the breast. After having bestowed upon them the rights of sepulture, they come once a day, for several weeks, and press from the nipple a few drops of milk upon the grave of the departed suckling*. This is positively affirmed by the Jesuit *Charlevoix*, who was frequently an eye-witness of the fact. Thus the sentiment of DEITY, and that of the immortality of the soul, are interwoven with our affections the most completely animal, and especially with maternal tenderness.

* See Father *Charlevoix*, his Travels through America.

But

But Man has not satisfied himself with admitting intellectual beings to a share of his repast, and, in some measure, with inviting them to his table; he has found the means of elevating himself to their rank, by the physical effects of those very aliments. It is singularly remarkable, that several savage Nations have been discovered, who scarcely possessed industry sufficient to procure food for themselves; but not one who had not invented the means of getting drunk. Man is the only animal who is sensible to that pleasure. Other animals are content to remain in their sphere. Man is making perpetual efforts to get out of his. Intoxication elevates the mind. All religious festivals among Savages, and even among polished Nations, end in feasting, in which men drink till reason is gone: they begin, it is true, with fasting, but intoxication closes the scene. Man renounces human reason, that he may excite in himself emotions that are divine. The effect of intoxication is to convey the soul into the bosom of some deity. You always hear toppers celebrating, in their songs, *Bacchus*, *Mars*, *Venus*, or the God of Love. It is farther very remarkable, that men do not abandon themselves to blasphemy till they arrive at a state of intoxication; for it is an instinct as usual to the soul, to cleave to the DEITY, when it is in it's natural state, as to abjure Him when it is corrupted by vice.

Of the Sense of Smelling.

The pleasures of smell are peculiar to Man; for I do not comprehend under it the olfactory emanations by which he forms a judgment of his aliments, and which are common to him with most animals. Man alone is sensible to perfumes, and employs them to give more energy to his passions. *Mahomet* said, that they elevated his soul to Heaven. Whatever may be in this, the use of them has been introduced into all the religious ceremonies, and into the political assemblies, of many Nations. The *Brazilians*, as well as all the Savages of North-America, never deliberate on any object of importance, without smoking tobacco in a calumet. It is from this practice that the calumet is become, among all those Nations, the symbol of peace, of war, of alliance, according to the accessories with which it is accompanied.

It is, undoubtedly, from the same custom of smoking, which was common to the *Scythians*, as *Herodotus* relates, that the caduceus of *Mercury*, which has a striking resemblance to the calumet of the Americans, and which appears, like it, to have been nothing but a pipe, became the symbol of commerce. Tobacco increases, in some measure,

sure, the powers of the understanding, by producing a species of intoxication in the nerves of the brain. *Lery* tells us, that the Brasilians smoke tobacco till it makes them drunk. It is to be observed, that those nations have found out the most cephalic plant of the whole vegetable kingdom, and that the use of it is the most universally diffused of all those which exist on the Globe, the vine and the corn-plants not excepted. I have seen it cultivated in Finland, beyond Viburg, in about the sixty first degree of North Latitude. The habit of using it becomes so powerful, that a person who has acquired it, will rather forego bread, for a day, than his tobacco. This plant is, nevertheless, a real poison; it affects, at length, the olfactory nerves, and sometimes the sight. But Man is ever disposed to impair his physical constitution, provided he can strengthen in himself the intellectual sentiment.

Of the Sense of Seeing.

Every thing that has been said, in detailing certain general Laws of Nature, harmonies, conformities, contrasts, and oppositions, refers principally to the sense of seeing. I do not speak of adaptation, or correspondence; for this belongs to the sentiment of reason, and is entirely distinct from matter. The other relations are, in truth,

founded on the reason itself of Nature, which communicates delight to us by means of colours and forms generative and generated, and inspires melancholy by those which announce decomposition and destruction. But, without entering upon that vast and inexhaustible subject, I shall, at present, confine myself to certain optical effects, which involuntarily excite in us the sentiment of some of the attributes of Deity.

One of the most obvious causes of the pleasure which we derive from the sight of a great tree, arises from the sentiment of infinity kindled in us, by it's pyramidical form. The decrease of it's different tiers of branches, and tints of verdure, which are always lighter at the extremities of the tree, than in the rest of it's foliage, give it an apparent elevation, which never terminates. We experience the same sensations in the horizontal plan of landscapes, in which we frequently perceive several successive hilly elevations flying away one behind another, till the last melt away into the Heavens. Nature produces the same effect in vast plains, by means of the vapours which rise from the banks of the lakes, or from the channels of the brooks and rivers that wander through them; their contours are multiplied in proportion to the extent of the plain, as I have many a time remarked. Those vapours present themselves on different plans;

plans; sometimes they stand still, like curtains drawn along the skirts of the forests; sometimes they mount into columns over the brooks which meander through the meadows: sometimes they are quite gray; at other times they are illumined and penetrated by the rays of the Sun. Under all these aspects, they display to us, if I may venture to use the expression, several perspectives of infinity in infinity itself.

I say nothing of the delightful spectacle which the Heavens sometimes present to us, in the disposition of the clouds. I do not know of any Philosopher who has so much as suspected that their beauties were subjected to Law. One thing is certain, namely, that no one animal, which lives in the light, is insensible to their effects. I have spoken, in another place somewhat of their characters of amability or terror, which are the same with those of amiable or dangerous animals and vegetables, conformably to those of the days and of the seasons which they announce. The Laws of them which I have sketched, will suggest delicious subjects of meditation to any person disposed to study them, excepting those who are determined to apply the mechanical medium of barometers and thermometers. These instruments are good for nothing but the regulation of the atmosphere of our chambers. They too frequently conceal
from

from us the action of Nature ; they announce, in most instances, the same temperatures to the days which set the birds a-singing, and to those which reduce them to silence. The harmonies of Heaven are to be felt only by the heart of Man. All Nations, struck by their ineffable language, raise their hands and their eyes to Heaven, in the involuntary emotions of joy or of grief.

Reason, however, tells them that God is every where. How comes it that no one stretches out his arms toward the Earth, or to the Horizon, in the attitude of invocation ? Whence comes the sentiment which whispers to them, *God is in Heaven* ? Is it because Heaven is the place where light dwells ? Is it because the light itself, which discloses all objects to us, not being, like our terrestrial substances, liable to be divided, corrupted, destroyed, and confined, seems to present something celestial in it's substance ?

It is to the sentiment of infinity, which the sight of the Heavens inspires, that we must ascribe the taste of all Nations, for building temples on the summit of a mountain, and the invincible propensity which the Jews felt, like other Nations, to worship upon high places. There is not a mountain, all over the islands of the Archipelago, but what has it's church ; nor a hill, in China, but what

what has it's pagoda. If, as some Philosophers pretend, we never form a judgment of the nature of things, but from the mechanical results of a comparison with ourselves, the elevation of mountains ought to humiliate our insignificance. But the truth is, that these sublime objects, by elevating us toward Heaven, elevate thither the soul of Man, by the sentiment of infinity ; and, disjoining us from things terrestrial, waft us to the enjoyment of beauties of much longer duration.

The works of Nature frequently present to us several kinds of infinity at once : thus, for example, a great tree, the trunk of which is cavernous, and covered with moss, conveys to us the sentiment of infinity as to time, as well as that of infinity in point of elevation. It exhibits a monument of ages when we did not exist. If to this is added infinity of extension, as when we perceive through it's solemn branches, objects prodigiously remote, our veneration increases. Go on, and add to all these, the different ridges of it's mass, in contrast with the profundity of the valleys, and with the level of the plains ; it's venerable half-lights, which oppose themselves to, and play with, the azure of the Heavens ; and the sentiment of our own wretchedness, which it relieves, by the ideas of the protection which it affords in the thickness of it's trunk, immoveable as the rock, and in it's august summit,

summit, agitated by the winds, the majestic murmurs of which seem to sympathize with our distress. A tree, with all these harmonies, seems to inspire an inexpressible religious awe. *Pliny* says, in conformity to this idea, that the trees were the first temples of the Gods.

The sublime impression which they produce, becomes still more profound, when they recal to us some sentiment of virtue, such as the recollection of the great men who planted them, or of those whose tombs they shade. Of this kind were the oaks of Iulus at Troy. It is from an effect of this sentiment, that the mountains of Greece and Italy appear to us more respectable than those of the rest of Europe, though they are of no higher antiquity on the Globe, because their monuments, in ruins as they are, call to our remembrance the virtues of the persons who inhabited them. But this subject belongs not to the present article.

In general, the different sensations of infinity increase by the contrasts of the physical objects which produce them. Our Painters are not sufficiently attentive to the choice of those which they introduce into the fore-ground of their pictures. They would give a much more powerful effect to their back-ground scenery, if they opposed to it the frontispiece, not only in colours and forms, as they

they some time do, but in nature. Thus, for example, if the Artist wished to communicate an affecting interest to a cheerful and smiling landscape, he would do well to present it through a magnificent triumphal arch, crumbling into ruin by length of time. On the contrary, a city filled with Tuscan and Egyptian monuments, would have a still greater air of antiquity, when viewed from under a bower of verdure and flowers. We ought to imitate Nature, who never produces the most lovely plants, in all their beauty, such as mosses, violets, and roses, but at the foot of rustic rocks,

Not that consonances do not likewise produce a very powerful effect, especially when they seem to unite objects which are distinct from each other. It is thus, for instance, that the cupola of the College of the Four Nations, presents a magnificent point of view, when seen from the middle of the court of the Louvre, through the arcade of that palace which is opposite, for then you view it complete, with a portion of the Heaven under the arch, as if it were a part of the Louvre. But in this very consonance, which gives such an extent to our vision, there is likewise a contrast in the concave form of the arcade, with the convex form of the cupola.

The

The great art of moving is to oppose sensible objects to intellectual. The soul, in that case, takes a daring soar. It passes from the visible to the invisible; and enjoys, if I may be allowed the expression, in it's own way, by extending itself into the unbounded fields of sentiment and of intelligence. Among certain Tartar Tribes, when a great man dies, his groom, after the interment, leads out the horse which his master was accustomed to ride, places the clothes which he wore on the horse's back, and walks him, in profound silence, before the assembly, who, by that spectacle are melted into tears.

When the suppressed circumstances multiply, and unite themselves to some virtuous affection, the emotions of the soul are greatly heightened. Thus when, in the *Æneid*, *Iulus* is promising to make presents to *Nisus* and *Euryalus*, who are going in quest of his father to *Palanteum*, he says to *Nisus*:

Bina dabo argento perfecta atque aspera signis
Pocula, devictâ genitor quæ cepit Arisbâ;
Et tripodes geminos, auri duo magna talenta,
Cratera antiquum quem dat Sidonia Dido.

Æneid, Lib. ix. v. 263.

Two silver cups, emboss'd with nicest art,
I'll give, of warlike spoils my Father's part,
When fam'd Arisba fell; two tripods old;
A double talent, too, of purest gold;
Sidonian Dido's gift shall crown the rest,
A bowl antique, of generous love the test.

“ I will

“ I will present you with two silver cups of exquisite workmanship, with curious figures in alto-relievo. They became my father’s property at the capture of Arisba. To these I will add a pair of twin tripods ; two talents of massy gold ; and an ancient goblet, a token of affection from Queen *Dido*.”

He promises to the two youthful friends, united to each other in the tenderest bonds, double presents, two cups, two tripods to serve as stands for them, after the manner of the ancients, two talents of gold to replenish them with wine, but only one bowl from which they might drink together. And then, what a bowl ! he boasts neither of the materials of which it is composed, nor of the workmanship, as in the case of the other presents ; he connects it with moral qualities infinitely more interesting to the heart of friendship. It is antique ; it was not the prize of violence, but the gift of love. *Iulus*, no doubt, received it as a mark of affection from *Dido*, when she considered herself to be the wife of *Æneas*.

In all the scenes of passion, where the intention is to produce strong emotions, the more that the principal object is circumscribed, the more extended is the intellectual sentiment resulting from it. Several reasons might be assigned for this, the most

most important of which is, that the accessory contrasts, as those of littleness and greatness, of weakness and strength, of finite and infinite, concur in heightening the contrast of the subject. When *Poussin* conceived the idea of a picture of the universal deluge, he confined it to the representation of a single family. There you see an old man on horseback, on the point of drowning; and in a boat, a man, who is perhaps his son, presents to his wife, who has made shift to scramble up a rock, a little child dressed in a red petticoat, who, on it's part, is making every effort, with it's little feet, to get upon the rock. The back-ground of the landscape is frightful from it's black melancholy. The herbage and the trees are soaked in water, the Earth itself is penetrated by it, which is rendered visible by that long serpent, in eager haste to quit it's hole. The torrents are gushing down on every side; the Sun appears in the Heavens like an eye thrust out of it's socket: but the most powerful interest in the piece bears upon the feeblest object: a father and a mother, ready themselves to perish, are wholly engrossed in the preservation of their infant. Every feeling is extinguished on the Earth, but maternal tenderness is still alive. The human race is destroyed because of it's crimes, and innocence is going to be involved in the punishment. These unrestrained torrents, that deluged Earth, that lurid Atmosphere,

sphere, that extinguished Sun, those desolated solitudes, that fugitive family, all the effects of that universal ruin of the World, are wholly concentrated in an infant. There is no one, however, who, on viewing the small group of personages which surround it, would not exclaim: "There's the Universal Deluge!" Such is the nature of the human soul; so far from being material, it lays hold only of correspondencies. The less you display to it physical objects, the more you awaken in it intellectual feelings.

Of the Sense of Hearing.

Plato calls hearing and seeing the senses of the soul. I suppose he qualifies them particularly by this name, because vision is affected by light, which is not, properly speaking, a substance; and hearing, by the modulations of the air, which are not of themselves bodies. Besides, these two senses convey to us only the sentiment of correspondencies and harmonies, without involving us in matter, as smelling does, which is affected only by the emanations from bodies, tasting by their fluidity, and touching by their solidity, by their softness, by their heat, and by their other physical qualities. Though hearing and seeing be the direct senses of the soul, we ought not, however,

thence to conclude, that a man born deaf and blind must be an idiot, as some have pretended. The soul sees and hears by all the senses. This has been demonstrated in the case of the blind Princes of Persia, whose fingers, according to *Chardin's* report, are so astonishingly intelligent, that they can trace, and calculate, all the figures of Geometry on tablets. Such are, likewise, the deaf and the dumb, whom the *Abbé de l'Epée*, is teaching to converse together.

I have no occasion to be diffuse on the subject of the intellectual relations of hearing. This sense is the immediate organ of intelligence ; it is that which is adapted to the reception of speech, a faculty peculiar to Man, and which, by it's infinite modulations, is the expression of all the correspondencies of Nature, and of all the feelings of the human heart. But there is another language, which seems to appertain still more particularly to this first principle of ourselves, to which we have given the name of *sentiment* : I mean music.

I shall not dwell on the incomprehensible power which it possesses of rousing and quieting the passions, in a manner independent of reason, and of kindling sublime affections, disengaged from all intellectual perception : it's effects are sufficiently known. I shall only observe, that it is so natural
to

to Man, that the first prayers addressed to the DEITY, and the original Laws among all Nations, were set to music. Man loses a taste for it only in polished society, the very languages of which, at length, lose their accentuation. The fact is, that a multitude of social relations destroy, in a state of refinement, the correspondencies of Nature. In that state, we reason much, but scarcely feel any longer.

The AUTHOR of Nature has deemed the harmony of sounds to be so necessary to Man, that there is not a situation upon the Earth but what has it's singing bird. The linnet of the Canaries usually frequents, in those islands, the flinty gutters of the mountains. The goldfinch delights in sandy downs, the lark in the meadows, the nightingale in woods by the side of a brook, the bullfinch, whose note is so sweet, in the white thorn: the thrush, the yellowhammer, the greenfinch, and all other singing birds, have their favourite post. It is very remarkable, that all over the Globe they discover an instinct which attracts them to the habitation of Man. If there be but a single hut in a forest, all the song-birds of the vicinity come and settle around it. Nay, none are to be found except in places which are inhabited. I have travelled more than six hundred leagues, through the forests of Russia, but never met with small birds except in the neighbourhood of villages. On mak-

ing the tour of the fortified places of Russian Finland, with the General Officers of the Corps of Engineers, in which I served, we travelled sometimes at the rate of twenty leagues a day, without seeing on the road either village or bird. But when we perceived the sparrows fluttering about, we concluded that we must be drawing near some inhabited place. In this indication we were never once deceived. I relate it with the more satisfaction, that it may sometimes be of service to persons who have lost their way in the woods.

Garcillafo de la Vega informs us, that his father having been detached from Peru, with a company of Spaniards, to make discoveries beyond the Cordeliers, was in danger of perishing with hunger in the midst of their uninhabited valleys and quagmires. He never could have got out, had he not perceived in the air a flight of paroquets, which suggested a hope that there might be some place of habitation at no great distance. He directed his march to that point of the compass which the paroquets had pursued, and arrived, after incredible fatigue, at a colony of Indians, who cultivated fields of maize.

It is to be observed, that Nature has not given a musical voice to any one sea or river bird, because it would have been lost in the noise of the waters,

waters, and because the human ear could not have enjoyed it at the distance which they are destined to live from the land. If there are swans which sing, as has been alleged by some, their song must consist of but very few modulations, with some resemblance to the uncouth sounds uttered by the duck and the goose. That of the wild swans, which came lately and settled at Chantilly, has only four or five notes. Aquatic birds have shrill and piercing cries, by means of which they can make themselves heard in the regions of wind and tempest where they inhabit, and are in perfect correspondence with their noisy situations, and their melancholy solitudes.

The melodies of song-birds have similar relations to the sites which they occupy, and even to the distances at which they live from our habitations. The lark, who nestles among our corn, and delights in soaring perpendicularly till we lose sight of him, makes his voice to be heard in the air, after he is no longer perceptible to the eye. The swallow, who grazes the walls of our houses as he flies, and reposes on our chimneys, has a small gentle chirping voice, which does not stun the ear, as that of the songsters of the grove would do; but the solitary nightingale makes himself heard at the distance of more than half a league. He mistrusts the vicinity of man; and, neverthe-

less, always places himself within sight of his habitation, and within the reach of his ear. He chooses, for this effect, places which are the best conductors of sound, in order that their echoing may give more action to his voice. Having stationed himself in his orchestra, he warbles an unknown drama, which has it's exordium, it's exposition, it's recitative, it's catastrophe, intermingled sometimes with the most extravagant bursts of joy, sometimes with bitter and plaintive notes of recollection, which he expresses by long and deep sighs. He raises his song at the commencement of that season which renews the face of Nature, and seems to present Man with a representation of the restless career which lies before him.

Every bird has a voice adapted to the times and the stations of it's destination, and relative to the wants of Man. The loud clarion of the cock calls him up to labour at the dawn of day. The brisk and lively song of the lark, in the meadow, invites the swains and shepherdesses to the dance; the voracious thrush, which appears only in Autumn, summons the rustic vine-dresser to the vintage. Man alone, on his part, is attentive to the accents of the feathered race. Never will the deer, who sheds tears copiously over his own misfortunes, sigh over those of the complaining Philomel. Never did the laborious ox, when led to the slaughter,
after

after all his painful services, turn his head toward her, and say: "Solitary bird, behold in what manner Man rewards his servants!"

Nature has diffused these distractions, and these consonances of fortune, over volatile beings, in order that our soul, susceptible as it is of every wo, finding every where occasions of extending that susceptibility, might every where be enabled to alleviate the pressure. She has rendered insensible bodies themselves capable of these communications. She presents to us, frequently, in the midst of scenes which pain the eye, other scenes which delight the ear, and soothe the mind with interesting recollections. It is thus that from the bosom of forests, she transports us to the brink of the waters, by the rustling of the aspens and of the poplars. At other times she conveys to us, when we are by the side of the brook, the noise of the Sea, and the manœuvres of navigation, in the murmuring of reeds shaken by the wind. When she can no longer seduce our reason by foreign imagery, she lulls it to rest by the charm of sentiment: she calls forth from the bosom of the forests, of the meadows, and of the valleys, sounds ineffable, which excite in us pleasing reveries, and plunge us into profound sleep.

Of

Of the Sense of Touching.

I shall make but a few reflections on the sense of touching. It is the most obtuse of all our senses, and, nevertheless, it is, in some sort, the seal of our intelligence. To no purpose is an object exposed to the examination of the eye, in every possible position; we cannot be persuaded that we know it, unless we are permitted to put it to the touch. This instinct proceeds, perhaps, from our weakness, which seeks in these approximations points of protection. Whatever may be in this, the sense in question, blunt as it is, may be made the channel of communicating intelligence, as is evident from the example adduced by *Chardin*, of the blind men of Persia, who traced geometrical figures with their fingers, and formed a very accurate judgment of the goodness of a watch, by handling the parts of the movement.

Wise Nature has placed the principal organs of this sense, which is diffused over the whole surface of our skin, in our hands and feet, which are the members the best adapted to judge of the quality of bodies. But in order that they might not be exposed to the loss of their sensibility, by frequent shocks, she has bestowed on them a great degree
of

of pliancy, by dividing them into several fingers and toes, and these again into several joints ; farther, she has furnished them, on the points of contact, with elastic half-pincers, which present, at once, resistance in their callous and prominent parts, and an exquisite sensibility in the retreating parts.

It is matter of astonishment to me, however, that Nature should have diffused the sense of touching over the whole surface of the human body, which becomes thence exposed to variety of suffering, while no considerable benefit seems to result from it. Man is the only animal laid under the necessity of clothing himself. There are, indeed, some insects which make cases for themselves, such as the moth ; but they are produced in places where their clothing is, if I may say so, ready made. This necessity, which is become one of the most inexhaustible sources of human vanity, is, in my opinion, one of the most humiliating proofs of our wretchedness. Man is the only being who is ashamed of appearing naked. This is a feeling of which I do not discern the reason in Nature, nor the similitude in the instinct of other animals. Besides, independently of all sense of shame, he is constrained, by powerful necessity, to clothe himself, in every variety of climate.

Certain

Certain Philosophers, wrapped up in good warm cloaks, and who never stir beyond the precincts of our great cities, have figured to themselves a natural Man on the Earth, like a statue of bronze in the middle of one of our squares. But to say nothing of the innumerable inconveniencies which must, in such a state, oppress his miserable existence from without, as the cold, the heat, the wind, the rain, I shall insist only on one inconvenience, which is but slightly felt in our commodious apartments, though it would be absolutely insupportable to a naked man, in the most genial of temperatures; I mean the flies. I shall quote, to this purpose, the testimony of a man whose skin ought to have been proof against this attack: it is that of the free-booter *Raveneau de Lussan*, who, in the year 1688, crossed the isthmus of Panama, on his return from the South Seas. Hear what he says, speaking of the Indians of Cape de Gracias a Dios: “When they are overtaken with an inclination to go to sleep, they dig a hole in the sand, in which they lay themselves along, and then cover themselves all over with the sand which they had dug out; this they do to shelter themselves from the attack of the musquitos, with which the air is frequently loaded. They are a kind of little flies, that are rather felt than seen, and are armed with a sting so keen, and so
“venemous

“venemous, that when they fix on any one, they
“seem to dart a shaft of fire into the blood.

“The poor wretches are so grievously tormented
“with those formidable insects, when it does not
“blow, that they become like lepers; and I can
“affirm it as a serious truth, for I know it from
“my own experience, that it is no slight evil to
“be attacked by them; for, besides their pre-
“venting all rest in the night-time, when we were
“obliged to trudge along, with our backs naked
“for want of shirts, the unceasing persecution of
“those merciless little animals drove us almost to
“madness and despair *.”

It is, I am disposed to believe, on account of the troublesomeness of the flies, which are very common, and very necessary, in the marshy and humid places of hot countries, that Nature has placed but few quadrupeds with hair, on their shores, but quadrupeds with scales, as the tatou, the armadillo, the tortoise, the lizard, the crocodile, the cayman, the land-crab, bernard-the-hermit, and other scaly reptiles, such as serpents, upon which the flies have not the means of fastening. It is, perhaps, for this reason, likewise, that hogs and wild-boars, which take pleasure in frequenting

* Journal of a Voyage to the South-Sea in 1688.

such places, are furnished with hair long, stiff, and bristly, which keep volatile insects at a distance.

Once more, Nature has not employed, in this respect, any one precaution in behalf of Man. Of a truth, on contemplating the beauty of his forms, and his complete nakedness, it is impossible for me not to admit the ancient tradition of our origin. Nature, in placing him on the Earth, said to him :
“ Go, degraded creature, animal destitute of clothing, intelligence without light ; go, and provide
“ for thy own wants ; it shall not be in thy power
“ to enlighten thy blinded reason, but by directing
“ it continually toward Heaven, nor to sustain thy
“ miserable life, without the assistance of beings
“ like thyself.” And thus, out of the misery of Man, sprung up the two commandments of the Law.

18/11/3

END OF THE THIRD VOLUME.



